DECLARATION OF GARRY KITCHEN

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Appendix K	Mike Fahey, *Mad Catz's Major League Gaming Controllers Can Change the Way You Play,* Kotaku (Aug. 22, 2011), https://kotaku.com/5833385/mad-catzs-major-league-gaming-controllers-can-change-the-way-you-play

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Appendix T	Definition of “peer-to-peer”, Google Dictionary
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Appendix X	Ian Poole, *Wi-Fi / WLAN Channels, Frequencies, Bands & Bandwidths*, Radio-Electronics, https://www.radio-electronics.com/info/wireless/wi-fi/80211-channels-number-frequencies-bandwidth.php
Appendix Y	Robert Valdes, *How Xbox 360 Works: Xbox Controller*, HowStuffWorks (2005), https://electronics.howstuffworks.com/xbox-three-sixty5.htm

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I. INTRODUCTION

1. I have been retained by counsel for Nintendo Co., Ltd. and Nintendo of America Inc. (“Petitioners” or "Nintendo") as a technical expert in connection with the proceedings identified above. I have been asked to provide my opinions and views on the materials I have reviewed in relation to U.S. Patent No. 9,126,119 (“the ‘119 patent”) (Ex. 1001) and the scientific and technical knowledge regarding the subject matter of the ‘119 patent before and at the earliest effective U.S. filing date. I submit this Declaration in support of Nintendo's Petitions for *Inter Partes* Review (“Petition”) of the ‘119 patent against Patent Owner Gamevice (“Patent Owner” or “Gamevice”).

II. PROFESSIONAL BACKGROUND, QUALIFICATIONS AND COMPENSATION

A. Education

2. I am an engineer, video game designer, entrepreneur and consultant. I received a Bachelor of Science in Electrical Engineering in 1980 from Fairleigh Dickinson University, where I was awarded membership in the Eta Kappa Nu Honor Society, and the Electrical Engineering and Computer Engineering Honor Society of the Institute of Electrical and Electronic Engineers (IEEE). As an Electrical Engineering student, I was twice chosen to receive the Engineering Merit Scholarship from Panasonic / Matsushita Corporation of Japan, one of the largest consumer electronics companies in the world.

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B. Professional Experience

3. My career in the electronic entertainment/video game industry includes over 35 years of experience running game development companies, with significant hands-on technical and creative experience in all game genres, including console, PC retail and download, online, mobile, and dedicated electronic. I have personally developed video game software that have generated career sales in excess of $350 million.

4. I have been directly involved in the design, development, and publication of hundreds of commercially-released video game products, across a breadth of hardware platforms, from the earliest Atari machine through the present-day Apple iPhone. In that capacity I have personally designed and programmed video games, acted as a co-designer and/or co-developer on numerous games, managed development teams from small to large, run development studios and game publishers, and served as Vice President of Game Publishing for Nickelodeon Television, a division of media giant Viacom.

5. In 1979, while still in engineering school, I invented and developed the handheld electronic game Bank Shot for Parker Brothers, named one of the "10 Best Games of 1980" by OMNI Magazine, and also recognized as one of the year's top games by Games Magazine. Bank Shot utilized a customized version of the American Microsystems (AMI) S-2000 4-bit microprocessor, a state-of-the-art (at

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the time) single chip microcomputer. I was awarded U.S. patent #4,346,892 ("Electronic Pool Game") for the invention of Bank Shot.

6. In 1980, I reverse engineered the hardware and software of the Atari 2600 game platform, developing one of the first third-party compatible games for the system (Space Jockey).

7. In 1982, I designed and programmed the Atari 2600 adaptation of the hit arcade game Donkey Kong, which achieved revenues in excess of $100 million on 4 million units sold, making it one of the top selling video games of 1982.

8. From June 1982 to March 1986, I was a Senior Designer for Activision, Inc., during which time I designed and developed numerous games, including the hit title Keystone Kapers, which earned a Video Game of the Year (1983) – Certificate of Merit from Electronic Games Magazine.

9. From 1984–1985, I developed Garry Kitchen's GameMaker, a suite of 5 professional quality design tools connected to an easy-to-use programming language that allowed novice game makers to create commercial quality video games. Computer Entertainer Magazine honored me as Video Game Designer of the Year (1985) for my work on Garry Kitchen's GameMaker.

10. In 1986, I co-founded Absolute Entertainment, Inc. and served as Chairman, President & CEO until November 1995. Absolute Entertainment, Inc. was a console game publisher licensed by Nintendo, Sega, Sony, 3DO and Atari

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and was a video game developer of over one hundred marketed titles from 1986 to 1995. Absolute Entertainment was the first North American-based game studio licensed to develop games for Nintendo game consoles.

11. From 1986-1987, I served as a consultant for RCA David Sarnoff Research Center in Princeton, New Jersey, on the potential entertainment applications of Digital Video Interactive (DVI), one of the first technologies to store full-motion video on a CDROM. DVI was introduced to great acclaim at the second annual Microsoft CD-ROM Conference in 1987. DVI technology was subsequently acquired and commercialized by Intel Corporation.

12. In 1995, I co-founded Skyworks Technologies, Inc., an early, pioneering online game company. At Skyworks, as President & CEO, I led the creation of one of the first large-scale online free gaming websites, Candystand.com, for LifeSavers Candy Company, then a division of Nabisco Inc. The Candystand, launched in 1997, is recognized as one of the first and most successful examples of advergaming, the integration of gaming and advertising. Candystand's innovative approach to online marketing was later the subject of a Harvard Business School case study.

13. In addition to our pioneering work in online games, Skyworks performed technical consulting for and provided content to the Sega Channel, one of the first downloadable game content delivery systems deployed in the United

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States. From 1993-1998, Sega Channel delivered Sega Genesis-compatible games for rental over coaxial cable. Sega Channel was named one of 1994's most innovative products by Popular Science Magazine. At its peak, Sega Channel was available in over 20 million homes through 21 cable suppliers.

14. Under my leadership, Skyworks became the preeminent supplier of promotional games (advergames) to the world's largest brands, including Kraft Foods, Nabisco, Post Cereal, Pepsi, Coke, BMW, Toyota, Ford Lincoln Mercury, General Motors, Campbell's, Fox Sports, CBS, Mattel, ESPN, Microsoft Network, Showtime, Yahoo, MTV, the Weather Channel, Comedy Central, Cartoon Network, Sony Pictures, Discovery Channel, Unilever, P&G and many others.

15. In 2008, Skyworks entered the smartphone app marketplace with the introduction of Arcade Hoops Basketball, an iPhone app that I personally developed and programmed. Arcade Hoops Basketball has been downloaded more than 10,000,000 times on the Apple App store. Skyworks became a leading publisher of games on the Apple iPhone platform with over 50 million total downloads to date.

16. From 2010-2012, I served as the Vice President of Game Publishing for Nickelodeon/Viacom Media Networks, a division of Viacom Inc., a $15 billion media conglomerate whose holdings include BET Networks, MTV, VH1, CMT, Nickelodeon, Spike TV, Comedy Central and Paramount Pictures. While at

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Viacom, I led development of the Addicting Games mobile app for the Apple iPhone, the first Viacom-published app to reach #1 in the Apple App store. The Addicting Games mobile app was honored with a 2012 Webby Award from the International Academy of Digital Arts and Sciences in the category of Games (Handheld Devices). The Addicting Games mobile app was the sixth iPhone-compatible game developed personally by me or under my direct supervision that has risen to #1 in the Apple App store, a marketplace with over 2,000,000 individual titles.

17. I have served numerous times as a technical expert in matters regarding video games and electronic entertainment products. My clients in these cases have included some of the largest entertainment companies in the world, including Sony Computer Entertainment, Nintendo, Hasbro, Konami Digital Entertainment, Ubisoft, Activision, LEGO and Zynga.

18. I have been the recipient of numerous awards for my contributions to the field of interactive entertainment. I have received Lifetime Achievement Awards in Video Games from The Doctor Fad Show, a syndicated educational television program, as well as the Classic Gaming Expo. Other awards I have received include New Jersey Entrepreneur of the Year Finalist (Inc. Magazine, Merrill Lynch and Ernst & Young), Bosslevel – The World's Top 100 Game

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Developers, Software Publishers Association (SPA) Excellence in Software, Video Game Designer of the Year and Nominee- Video Game of the Year.

19. I am recognized as an industry expert in the areas of electronic entertainment, online and mobile gaming and interactive advertising and have spoken and/or appeared at many industry events. My speaking engagements have included the Qualcomm Q-Tech Forum 2012, Consumer Electronics Show, National Cable Show, Digital Media Summit, Game Developers Conference (GDC), Digital Hollywood, iMedia Breakthrough Summit, Gamer Technology Conference, Classic Gaming Expo, Casual Connect, Portland Retro Gaming Expo, Advertising in Gaming Conference, DMExpo, and the VNU Digital Marketing Conference.

20. I have been interviewed in a number of print and online publications, including Bloomberg Business, Retro Gamer Magazine, Atarian Magazine, Wired, Video Game Collector, Electronic Games Magazine, Retro Magazine, 3-2-1 Contact, Fast Company, and Business 2.0. I have also been interviewed numerous times in the broadcast media, having appeared on the Dr. Fad Show, All Access Television, CNN Real News For Kids, Good Morning Atlanta, ABC Eyewitness News, NBC's Sunday Today in New York, and CNN FN Entrepreneurs Only. Additionally, I appear in a number of documentary films recounting the history of the video game industry, including World 1-1, Atari: Game Over, Unlocked: The

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World of Games, Revealed, The Artists: The Creative Visionaries Behind the Rise of the Modern Video Game, and Batteries Not Included, "a documentary about the genius behind that thing you had when you were a kid..."

21. My education, professional experience and case history as an expert witness are described in my Curriculum Vitae, attached as Appendix A.

C. Publications

22. I have performed in a business and technical management role in the publication of hundreds of commercial software products. In addition, I have had direct involvement in the development of over 80 commercial software products, either as designer, co-designer, software author or co-author. A list of these published titles is included in my Curriculum Vitae, attached as Exhibit 1.

D. Compensation

23. I am compensated in this matter at my standard rate of $600/hour. My compensation is in no way affected by the outcome of this litigation.

III. BASIS FOR OPINION

24. My opinions and views set forth in this report are based on my education, training, and experience in the relevant field, as well as the materials I reviewed in this case, and the scientific knowledge regarding the same subject matter that existed prior to the priority date of the '119 patent.

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IV. PATENT LAW STANDARD

25. I am not an attorney. I have been informed about certain aspects of the law that are relevant to my opinions. My understanding of the law is as follows:

A. Person of Ordinary Skill in the Art

26. I understand that patents and prior art references are analyzed from the point of view of a Person of Ordinary Skill in the Art at the time of the invention of the ‘119 patent (POSITA). In my opinion, a POSITA in the context of the technology claimed in the ‘119 patent (either in 2015 or in 2012) would have had the equivalent of a bachelor’s degree in mechanical, electrical, or computer engineering or other technical training in product design or, equivalent work experience in the development of interactive products. Such a person would possess at least one year of experience in developing and/or evaluating interactive products. Relevant professional or practical experience or degrees in other subject areas where a person would gain experience of this type may also suffice to qualify a person as skilled in the art.

27. Based on my educational background and work experience, I am and was familiar with the technology at issue as of the 2015 timeframe in which the application for the ’119 patent was filed (and before). My educational background and experience also allow me to evaluate what knowledge a POSITA, as defined

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above, would have because I have and have worked with many people with similar qualifications. My educational background and experience also provide me with insight into the educational level and familiarity of a person working in the interactive entertainment field during the relevant time frame.

28. I believe I am familiar with what such a POSITA would understand from reading the '119 patent, a particular cited reference, or other evidence included in the record of the Petition. In this declaration, when discussing what a document discloses or suggests, I am describing what I believe a POSITA would have understood as being disclosed or suggested by the document during the relevant time frame.

B. Claim Construction Principles

29. I have been informed and understand that claim construction is a matter of law and that the final claim construction will ultimately be determined by the Patent Trial and Appeal Board (the "Board"). I have been informed and understand that patent claims are construed from the perspective of one of ordinary skill in the art at the time the claimed invention was made.

30. I have been informed and understand that, in an *inter partes* review, the claim terms are to be given their broadest reasonable construction or interpretation ("BRI") in light of the specification. In performing my analysis and rendering my opinions, I have interpreted claim terms for which the Petitioners

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have not proposed a BRI construction by giving them the ordinary meaning they would have to the POSITA reading the '119 patent in light of its specification.

31. I also understand that under the applicable version of 35 U.S.C. 112 ¶ 6, "an element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof."

32. I understand that construing means-plus-function claim terms involves two steps. The first step is to identify the claimed function. The second step is to identify the structures that are described in the specification. I understand that the means-plus-function claim term is limited to those structures described in the specification that correspond to the claimed function, and their equivalents. I further understand that expressing an element in a claim in terms of a "means for …" leads to a presumption that 35 U.S.C. 112 ¶ 6 applies, but that even if an element is not expressed using the term "means," it may still be considered a means-plus-function limitation.

C. Invalidity

33. I understand that a patent claim is invalid if it is anticipated or rendered obvious by the prior art. I have been informed and understand that a patent claim is anticipated if a single prior art reference discloses each and every

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element of the claim, arranged as set forth in the claim. I further understand that if a reference fails to expressly disclose one or more elements of the claim, the claim is anticipated if the reference inherently discloses the missing elements.

34. I have further been informed and understand that a patent claim is invalid if the differences between the subject matter of the claim and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a POSITA to which the subject matter pertains. I understand that a determination of whether a claimed invention would have been obvious requires taking into consideration certain factors, which include: (a) assessing the scope and content of the prior art, (b) the differences between the claimed invention and the prior art, and (c) the level of ordinary skill in the art. I further understand that secondary considerations, such as commercial success, the solution of long-recognized but unsolved needs, failures of others, etc., may be considered in a determination of obviousness.

35. I understand that the claimed subject matter would have been obvious to a POSITA if, for example, it results from the combination of known elements according to known methods to yield predictable results, the simple substitution of one known element for another to yield predictable results, use of a known technique to improve similar devices in the same way, or applying a known technique to a known device ready for improvement to yield predictable results. I

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have also been informed that the analysis of obviousness may include recourse to logic, judgment, and common sense available to a POSITA that does not necessarily require explicit disclosure in any reference.

36. I understand that, in determining obviousness, hindsight derived from consideration of the patent should not be used.

37. It is my understanding that "prior art" includes at least patents and printed publications in the relevant literature and information that predate the filing date of the '119 patent.

V. THE '119 PATENT

38. The '119 patent discloses and claims a game controller that attaches to a separate portable computing device. There are multiple embodiments disclosed, but the claimed game controller includes structural and communications components, including a "communication port" that provides a "communication link" and two "confinement structures" secured by a "structural bridge." An "input device" that consists of two "control modules," or game controller panels, are attached to the confinement structures. The control modules contain "apertures" and

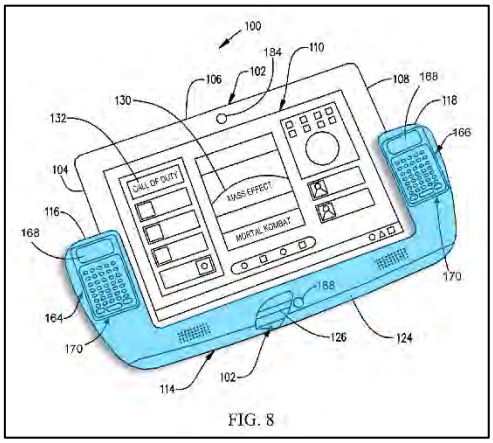


FIG. 8

"instructional input devices" in the form of buttons, joysticks, a keyboard module, or other known input means.

39. The original embodiment is shown in Figure 8 above. This shows an electronic computing device (tablet) that is seated in an external controller with two sides and a bottom bridge section (blue). Each side of the controller contains input controls such as buttons, a d-pad, or joysticks, and could also include keyboard modules. Figure 14 (shown to the left) discloses a modified controller that contains the two game control modules (blue) with a different external structure (red), which is a structural bridge, connecting them behind the back side of the computing device. The application leading to the ’357 patent disclosed this embodiment.

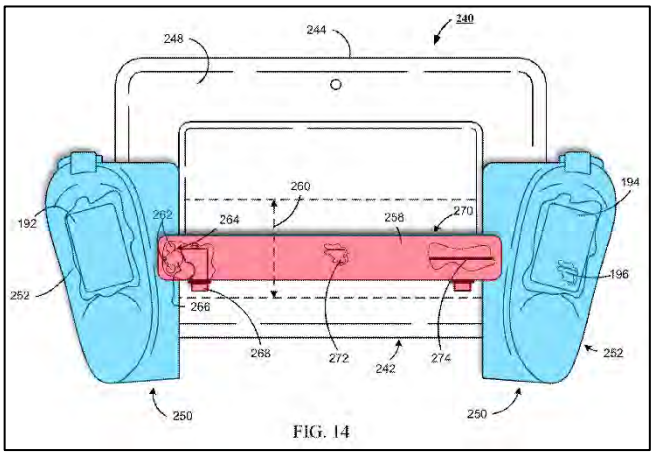


FIG. 14

40. There is also another embodiment that was not disclosed in the '357 patent or its application. Figure 16, left, shows the back of an alternative combination containing components that are recited in claim 1 of the ’119 patent. This controller and certain of its components—for example, the

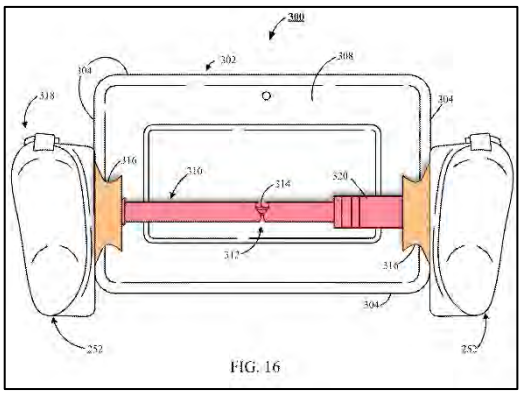


FIG. 16

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separate confinement structures (orange)—were added to the ’119 patent and claimed for the first time. The two game control modules (which make up the "input device") are connected to the two confinement structures, which confine the computing device on two sides and are secured together by a structural bridge (labeled in red). The "communication port" is identified as the structural bridge and provides the two confinement structures and the communication link, as recited in claim 1.

VI. BACKGROUND OF THE TECHNOLOGY

41. Removable or "swappable" game controls for use with a portable computing device were well known in the art at the time of the ‘119 patent and came in multiple forms.

42. By way of background, the earliest video game systems featured swappable input devices, or controllers. Early designers recognized the importance of giving the consumer the choice of what type of controller they would like to use. For example, the Atari 2600, released in 1977, offered a choice of easily-swappable controllers:





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Atari 2600 game controllers using common attachment structure[1] [2]

43. One of the earliest handheld gaming systems, Microvision, released by Milton Bradley in 1979, was the first portable game system to feature interchangeable game cartridges. In addition to swapping out the game program, the machine also allowed one to swap out the input device, or controller, making it unique to each game. See the image below highlighting the different control schemes for each game:

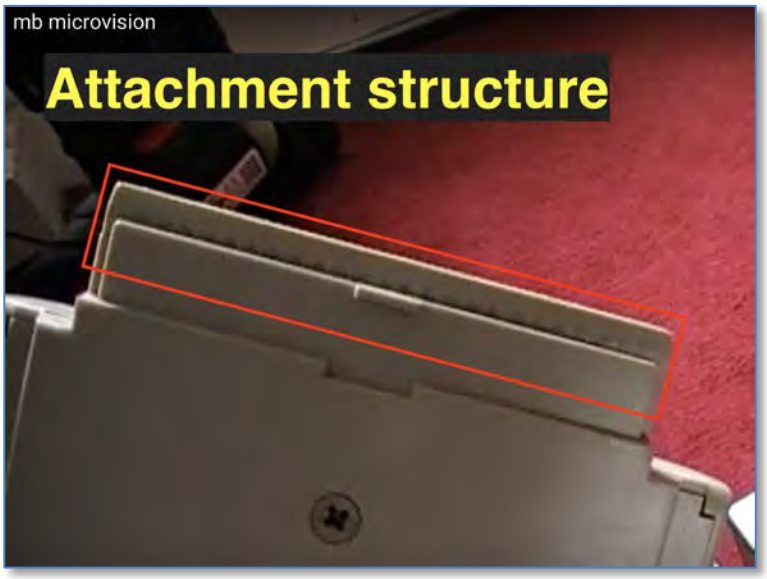


Microvision game cartridges with swappable input devices[3]

44. The Microvision cartridges were fitted with an attachment structure to securely connect them to the game unit:

[1] https://images-na.ssl-images-amazon.com/images/I/81mOT6QG9GL._SX425_.jpg, Appendix B
[2] http://www.museumofplay.org/online-collections/images/Z008/Z00828/Z0082877.jpg, Appendix C
[3] https://i0.wp.com/www.popculturemaven.com/wp-content/uploads/2014/02/microvision-and-carts.jpg, Appendix D

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Closeup of Microvision cartridge attachment structure[4]

45. Game accessory companies also developed products with interchangeable input controls (or "instructional input devices"). For example, the game accessory manufacturer Radica came out with a customizable game controller in 2004 for the PS2, called the Radica Phoenix Customizable Gamepad:



[4] https://www.youtube.com/watch?v=iT0CkY1hBJ4, Appendix E

Radica Phoenix Customizable Gamepad[5]

46. From the website Evertek[6], "The Radica 74160 Phoenix Revolution **contains unique interchangeable modules** that enable gamers to completely alter the set up of the controller **by repositioning the thumb sticks and action buttons** according to their own personal preference." (emphasis added). A photo showing the interchangeable input devices (or game control modules) is below.



Revolution controller module slots[7]

[5] http://itmedia.sk/olcso/IT4022/Szerszámok,%20alkatrészek/Joystick%20(Game%20Controller)/Playstation%202/Phoenix_Revolution_Playstation_PS2_Game_Controller, Appendix F
[6] https://evertek.com/viewpart.asp?auto=31979, Appendix G
[7] http://itmedia.sk/olcso/IT4022/Szerszámok,%20alkatrészek/Joystick%20(Game%20Controller)/Playstation%202/Phoenix_Revolution_Playstation_PS2_Game_Controller, Appendix F

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47. The company Saitek likewise introduced a customizable game controller in 2008, called the Saitek Cyborg Rumble Pad P3600.



Saitek Cyborg P3600 Rumble Pad[8]



Saitek input module attachment structure[9]

48. Pictured above, the Saitek gamepad allowed the player to remove an input module (containing the joystick and d-pad) and re-insert it at a different orientation to adjust the position of the joystick on the gamepad; see the DragonSteelMods review[10], "The pad is like other Saitek pads essentially, but the 'Cyborg' naming comes in with a part of the controller they call the 'Cyborg Module', the left side of the pad features a section that pops out, it includes the analogue stick and the d-pad, the whole thing can be rotated 180 degrees so the user can decide where the stick should be."

[8] https://www.cnet.com/news/saiteks-cyborg-rumble-game-pad-lets-you-flip-the-stick/, Appendix H
[9] http://www.dragonsteelmods.com/Images/reviews/saitek-cyborg-rumble/resize/tn_saitek-cyborg8.JPG, Appendix I
[10] https://www.dragonsteelmods.com/review-saitek-cyborg-rumble-pad-p3600-2/, Appendix J

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49. In 2011, another accessory manufacturer Mad Catz introduced their ProModule system[11], a modular game controller. The system allowed the player to swap out input controls, including d-pads, joysticks and buttons, on a given controller. A photo of the removable input devices is below.



Mad Catz removable input devices[12]

50. The individual input device elements of the Mad Catz's product included attachment structures and electrical connections to facilitate the swapping of game control options.

[11] https://kotaku.com/5833385/mad-catzs-major-league-gaming-controllers-can-change-the-way-you-play, Appendix K

[12] http://3.bp.blogspot.com/-P83ufX9xdaE/Tw1VNeX6Q9I/AAAAAAAAAfU/krFvECjU_oU/s1600/6.jpg, Appendix L

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Mad Catz removable game control elements with attachment structures[13] [14]

51. Yet another example of a system which allowed the player to swap out instructional input devices, including d-pads, joysticks and buttons, is disclosed in U.S. Patent Application No. US 2005/0255915 A1, titled "Game controller with Interchangeable Controls" and filed by Andrew Riggs in 2004, referred to as ("Riggs").

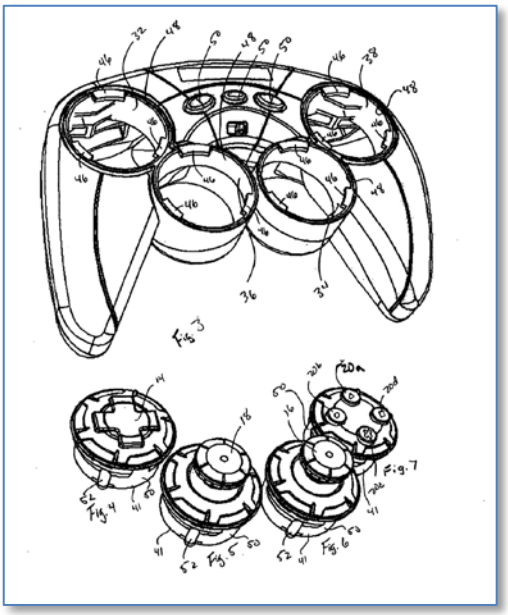
52. Like the Mad Catz ProModule system, Riggs discloses "a game controller that has a body, a first input location, a second input location and a first input device. The first input device is adapted to be removably coupled to the [controller] body at both the first input location and the second input location"; *see* Riggs Abstract. In other words, an input device, such as a joystick, button or d-pad, can be removed from the game controller and re-inserted at a different location on

[13] https://s.blogcdn.com/www.engadget.com/media/2012/01/compon-modula388.jpg, Appendix M
[14] http://3.bp.blogspot.com/-uLvxZyN3ln4/Tw1VMqhfniI/AAAAAAAAAfI/FPEWIwzXWPU/s1600/5.jpg, Appendix N

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the controller. Each of the removable input devices has attachment structures and electrical connections to facilitate the swapping of game controls; *see* Riggs ¶41, "Each module 41 has three protrusions… which are sized and configured to couple and frictionally lock with each of the protrusions 46 in the slots 38"; *also see* Riggs ¶35, "… each control or module slot access the electrical circuitry with the control pad 12 and has eight electronic contacts or pins 40*a-h* that electrically connect or communicate with the electrical contacts on each specific control device."

53. See Fig. 3 from Riggs, shown below:



Riggs Fig. 3, showing removable instructional input devices and game controller with input locations

54. As shown above, it was long known for gaming companies to develop a variety of input devices (i.e., controllers) that could be swappable, as well as contain interchangeable control modules. The purpose of these products has

always been to provide a variety of control options to gamers in order to improve the gaming experience and make controllers more comfortable and useful for gaming. This background, as explained further below, set the stage for the development of "swappable" or interchangeable control devices for use with smaller and lighter computers—smartphones and tablets, PDAs, and the like. As detailed in the next section, companies continued the idea of interchangeable controls and control modules by developing devices that would hold a portable computer (which could be used for gaming) but also allow interchangeable control devices and instructional input devices to improve the gaming experience.

VII. MOTIVATION TO COMBINE

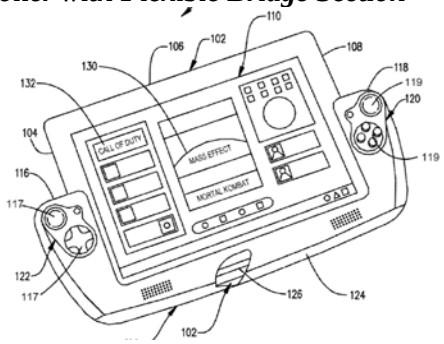
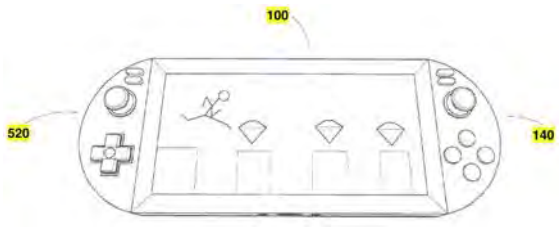
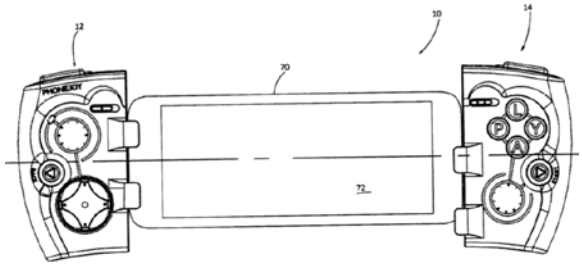
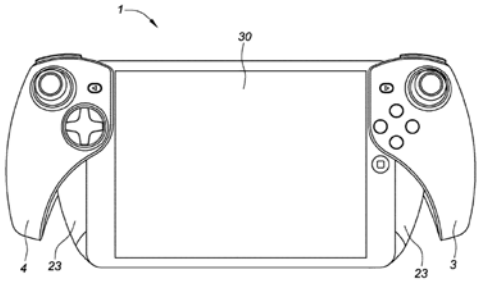
55. This declaration involves the technical analysis of six references in addition to the ‘119 patent: Schoenith, Willner, Michael, Kessler, Park, and Hirschman.

56. I understand that one of the considerations when determining obviousness is the question of whether or not the products disclosed in the body of patents being considered fall within the same product category; in other words, are they similar devices (that is, do they fall within the same class of device), are they addressing the same problem or market need, and would they benefit from the same improvement or innovation. Certainly, as I formed my opinions regarding motivations to combine the prior art, these are questions that I had to consider.

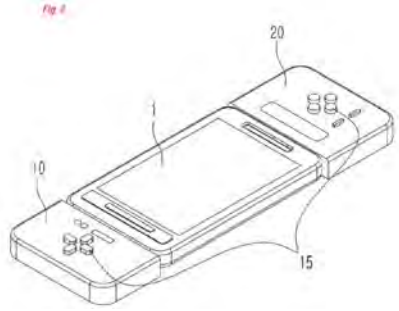
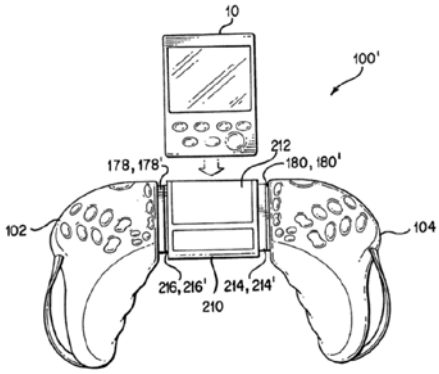
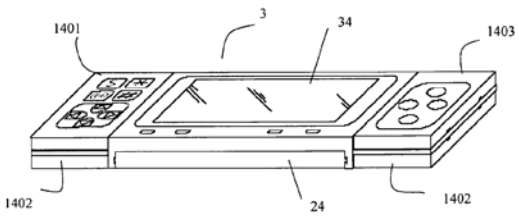
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57. In regards to the references that I have considered in this analysis, it is my opinion that the prior art references taught devices which fall within the same category - *associated controller accessories for separate handheld computing devices*. An even more specific subcategory would be *associated controller accessories for separate handheld gaming computing devices.* While the disclosures may mention ancillary usages, all of the devices address the handheld gaming market.

58. A visual review of the devices in question supports this categorization:

U.S. Patent No. 9,126,119 "***Combination Computing Device and Game Controller with Flexible Bridge Section***"  	**Hirschman**, U.S. Patent Application No. US 2015/0134859 A1 "***Multi-Configuration Computer***" 
Kessler, International Patent Application No. WO 2014/079264 A1 "***A Handheld Apparatus for Communicating Control Signals to an Information Processing Device***"  	**Schoenith**, U.S. Patent No. 9,539,507 B2 "***Apparatus and Method for Control Accessory***" 

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Park, Korean Patent No. 10-2011-0116892 "***Game pad device for mobile phone***" 	**Willner**, U.S. Patent App. US20010045938A1 ***"Hand grippable combined keyboard and game controller system"***  FIG. 4
Michael, U.S. Patent App. Pub. No. 2010/0195279 A1 ***"Docking station and kit for a personal electronic device"***  Fig. 15	

59. To expound on this opinion, a bit of background is helpful. The iPhone, a revolutionary step forward in mobile computing, came out in 2007. In addition to being a phone, it was the first mass-market, touchscreen-based, handheld computer system to achieve widespread commercial success. Indeed, it was a massive commercial success by any standard. Personal computing devices such as PDAs and early tablet-style computers were available before this time, but

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the iPhone became a mass-market success and gave rise to a market with many similar products—the smartphone generation.

60. In 2008, one year after the launch of the original iPhone, the Apple App Store opened, allowing consumers to download software applications ("apps") for their iPhone devices, further increasing the popularity of the platform. In 2010, Apple introduced the iPad, a tablet-sized version of the iPhone.

61. Gaming quickly became the number one application category on these types of devices, with tens of millions of games downloaded every year. However, the market quickly found that gamers preferred playing with physical controls, such as buttons, joysticks and d-pads, which resembled more traditional gaming control layouts pioneered by companies like Nintendo, Sony, and Microsoft. Some types of games simply do not work well with touchscreen (virtual) controls or tiny keyboards used on PDAs and other portable computers. There were also unanticipated problems with playing on a touchscreen, not the least of which was that the hand that is accessing the on-screen controls is also blocking the view of the game screen. Consequently, a market quickly evolved for devices which could offer a greater selection of game controller choices on mobile computing devices.

62. The references mentioned above (in particular, Schoenith, Michael, Park and Kessler) all directly addressed this market need in a similar way:

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- They all offered traditional, videogame console-style game controllers, with joysticks, d-pads and buttons.
- They all positioned the game controllers to either side of a landscape-oriented touchscreen display.
- From a user interface standpoint, the industrial design is similar, allowing the player to hold the device in the manner of a Nintendo, Xbox, or PlayStation controller.
- They all offer an integrated external controller which grips the mobile computing device while stabilizing the game controllers, creating the feel of a single gaming unit.

63. Willner, while earlier, provided the same essential design and addressed the same issue for use with a PDA or early-style portable computing device.

64. The references noted above were all in the same market segment with similar products, and thus they faced similar technical and design challenges and decisions. In addition, while Hirschman did not address the exact same market need (it actually provided the design of a tablet to work with its interchangeable controllers) and Willner was an earlier-filed reference (2001), they are similar enough to the other references to share in the same technical and design issues. Additionally, Willner, while coming a few years before the smartphone-related market described above fully developed, addresses many of the same issues, and similarly focused on mobile phones and PDAs (personal digital assistants). A POSITA considering a game controller in 2015 (or in 2012) would have been

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aware of Hirschman's and Willner's teachings and how they would apply to solve the issues presented by gaming on the newly-popular smartphones and tablets, given that they both teach the use of interchangeable controllers for gaming with portable electronic devices using a similar layout and design. Additionally, references such as Hirschman and Willner, along with others such as Michael, taught the benefits of flexibility in controller configuration and modes of use of controllers, including by disclosing interchangeable controller modules, remappable key configurations, and/or detachable or removable controllers. As to modes of use of controllers, Willner provided one reason for its detachable controllers was "to adopt a keyboard format that is arranged like a game controller operated by one or both of a user's hands, … [and to] allow[] users to enter data while seated in a reclined position away from a desk … ." Ex. 1014 ¶8. Thus, one of skill in the art would have been motivated to include detachable controllers to allow for greater modes of use.

65. Certain of these design/technical issues, addressed in the prior art, are also reflected in the claims of the '119 patent:

- Claim element 1(f)(i): "*a conduit between the pair of control modules*" – All of the references had the challenge of electrically connecting the two game controllers, despite the fact that they were positioned on opposite sides of the display. From a technical standpoint, the two game controllers must necessarily be electrically connected in some way.

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- Claim element 1(d)(i): "*an input device… in communication with the communication port.*" - In general, all of the references had to solve the same issues involving connectivity between the controllers, the mobile computing device, and power sources.
- Claim element 1(c): "*a pair of confinement structures adjacent to and confining the computing device*" - From a design standpoint, the references (other than Hirschman) had to create a bridge structure, to both hold the game controllers and hold the separate mobile device. Hirschman did not share this challenge because its controllers connected directly to the computing device (and did not have a separate structural bridge (as claimed in '119 patent) as part of a standalone controller accessory).
- Claim element 1(e)(ii): "*each of the pair of control modules provide an attachment structure cooperating with the communication port.*." - All of the devices had to deal with the question of whether the game controllers should be permanently mounted or have the ability to be swapped out, including Hirschman. This is essentially the basic question of how the controllers would attach to the controller device.
- The references also had to deal with the issue of size compatibility across a universe of different sized devices. It was well understood that tablets and smartphones (as well as other portable computing devices) were available in a variety of sizes, so any accessory game controller would need to work with devices of various sizes.

66. Given the above analysis, one of skill in the art would have recognized that an innovation or improvement taught in the prior art references

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would likely be applicable to the others. They would also be applicable to one designing a product like that disclosed in the ’119 patent.

67. Take, for example, the adjustable bridge of Kessler or Park. Schoenith, Willner, and Michael each disclose a device designed to accept a fixed-width mobile device in a cradle or frame of the controller (though Schoenith notes that different sized cradles could be used to accommodate different sized devices). An improvement which would allow the product to be compatible with many more devices, due to its ability to adjust to a specific device width, would be of great commercial value to any of the mobile device-related references discussed above. Such an improvement would also enable that accommodation without the need to provide multiple cradle or adaptor structure for each differently-sized computing device, thereby reducing the number of products the designer had to produce/manufacture and the number of products consumers had to purchase. Both Kessler and Park taught just such an improvement.

68. In summary, it is my opinion that all of the references are in the same product category – *associated controller accessories for separate handheld gaming computing devices* – and disclose compatible teachings that solved similar problems.

69. As explained above, the references, other than Hirschman, address the exact same problems and recognized market need. The explosive, and

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unanticipated, growth of the iPhone and touchscreen smartphones in general, created a market need for devices which could offer a greater selection of game controller choices on mobile computing devices. One skilled in the art would have been motivated to attempt a combination to address a recognized market need because they would be applying a known technique to a known device (in the same market segment) to yield a predictable result. Willner's and Hirschman's teachings would have been useful and applicable here as well, as they were already known and sufficiently similar to the other controllers taught, having solved the very problems noted by other references.

70. The references considered in this action that are specific to mobile devices, addressed this market need at approximately the same time, and in a similar way, each offering a device which integrated videogame-style controls to either side of a cradled landscape-oriented mobile computing device, creating the feel of a standalone portable gaming device.

71. Finally, given the above factors, one of skill in the art would have recognized that an innovation or improvement to one of the above inventions would be applicable to one or more of the other.

VIII. CLAIM CONSTRUCTION

72. As noted above, I understand that during an *inter partes* review, the claims are accorded their broadest reasonable interpretation in light of the

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specification. I have interpreted claim terms for which the Petitioners have not proposed a BRI construction by giving them the ordinary meaning they would have to the POSITA reading the ‘119 patent in light of its specification.

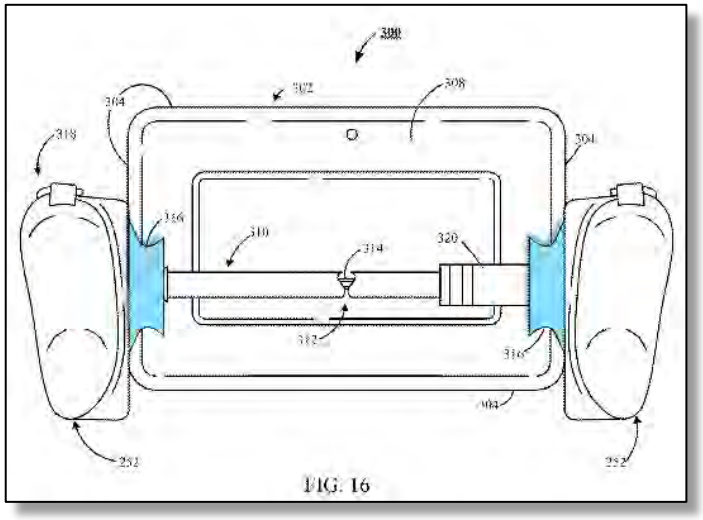
A. “Confinement structures" (claim 1)

73. Independent claim 1 requires the *communication port* to provide *a pair of confinement structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device.* The *pair of confinement structures* is recited in functional terms—only by what they do, *confining the computing device on at least two opposing sides*. Thus, while the phrase does not use the term "means," I understand that it is a means-plus-function limitation.

74. The function for the *pair of confinement structure* is: "confining the computing device on at least two opposing sides of the plurality of sides of the computing device." Next, I understand that the corresponding structure must be identified in the written description. Here, there is almost no meaningful structure provided in the written description beyond, at most, the embodiment shown generally in Figures 16-22 and limited written description. As a result, there is only one construction that is (even arguably) sufficiently definite.

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75. Figure 16 (annotated here) shows what the written description identifies as two confinement structures 316. They are shown adjacent to and confining the two sides of the computing device.



'119 patent Fig. 16 (annotated)

76. The specification further describes the confinement structures in functional language, stating that the communication port 310 "provides a pair of confinement structures 316, … which are preferably adjacent to and confining the computing device on at least two opposing sides…" Ex. 1001 at 8:1-5. Limited description of the confinement structures is further provided with regards to Figures 17 and 19-22, the descriptions for which describe the confinement structures as including a device cradle 336 and other features, such as docking pins 334, an interface feature, and signal input lands. *Id.*

77. In my opinion, in light of the functional language and the '119 patent's disclosures, the term *pair of confinement structures* should be construed as a

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means-plus-function phrase limited to the disclosures of Figures 16-22 (and accompanying description) or their equivalents. Even if "confinement structures" is not considered a means-plus-function term, its construction should be limited to the disclosures noted above and accompanying description because any broader interpretation would not be consistent with the specification.

B. "Structural bridge" (claim 1, 9-12)

78. In my opinion, the BRI of *structural bridge* is "a member separate from, and external to, the computing device that connects the confinement structures one to the other whether or not a computing device is present." Importantly, this term appears to be a "coined term" that appeared only in later embodiments; there is no plain and ordinary meaning of this term in the relevant art. The '119 patent used it, instead, in a particular manner.

79. As for the construction: a review of the '119 shows that every figure teaches a *structural bridge* that is **external** to and separate from the computing device that connects either the control modules or the confinement structures. *See* Ex. 1001 at Figs. 14-18, 25. The specification's discussion of a *structural bridge* is limited to descriptions of Figures 14 and 17, which include only an external structure that connects either the control modules or the confinement structures together, depending on the embodiment. *Id.* at 7:1-5; 8:28-35. The specification also provides that the computing device can be "remove[d]" from the controller

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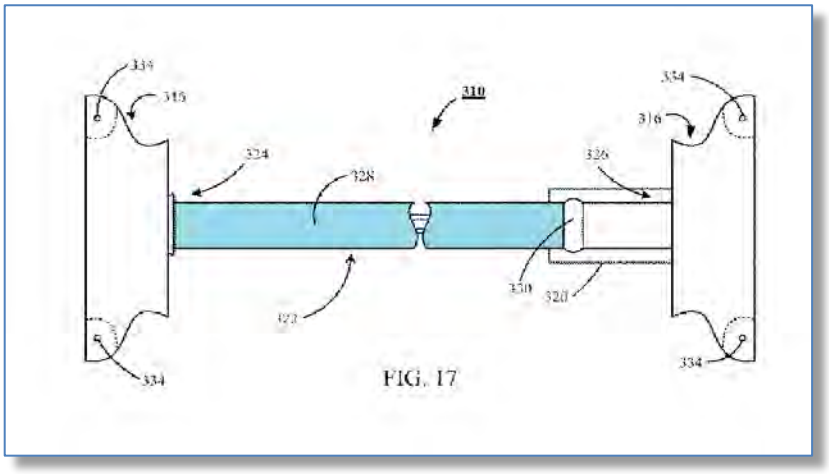
and it is the controller that provides the communication port, the input device, and the confinement structures. *Id.* at 8:44-53, Abstract. In the claims of the ’119 patent, the *structural bridge* is limited to securing the confinement structures one to the other, as shown in Figure 17, and is recited as a structure separate from the computing device. *Id.* at 10:19 (claim 1). Moreover, the computing device is claimed as comprising an electronic display screen, a back, and plurality of sides—but not the structural bridge.

80. In light of these disclosures, the BRI of *structural bridge* requires " a member separate from, and external to, the computing device that connects the confinement structures one to the other whether or not a computing device is present."

C. “Conduit" (claim 1)

81. In my opinion, the BRI of *conduit* is "closed tube or duct for confining and protecting wires or cables." The specification describes a *conduit* only once where it explains that, as shown in Figure 17, the "fastening mechanism 320, is preferably securely fastened to [*sic*] a conduit 328, of the structural bridge 322…." Ex. 1001 at 8:35-40. Figure 17 (shown below) shows the conduit 328 as a portion of the structural bridge 322 with wired components running through it. Ex. 1001 at Fig. 17.

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‘119 patent Fig. 17 (annotated)

82. Consistent with this usage, common dictionaries show that *conduit* has a well-understood meaning in ordinary parlance when used with regards to electrical devices. The American Heritage Dictionary defines conduit, as relevant here, as "a tube or duct for enclosing electric wires or cable." Ex. 1011 at 307. The usage of this term is consistent with my own understanding of the term "conduit" in the electronics context.

83. Thus, in my opinion a POSITA reading the ’119 patent's specification and claims would understand *conduit* to have its ordinary and reasonable interpretation in this context: a "closed tube for confining and protecting wires or cables."

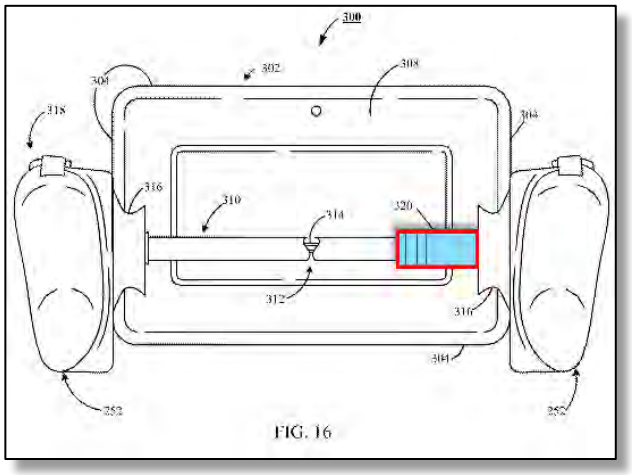
D. “Fastening mechanism" (claim 1)

84. Independent claim 1 requires that the *structural bridge* comprise a *fastening mechanism cooperating with the pair of confinement structures, the fastening mechanism secures the pair of confinement structures one to the other.*

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Ex. 1001 at 10:25-28. The *fastening mechanism* is recited in purely functional terms by what it does: *cooperating* with the confinement structures and *securing* them one to the other. Thus, while the phrase does not use the term "means," I understand that it is a means-plus-function limitation because it merely recites function with no structure.

85. The function of the *fastening mechanism* as claimed is "cooperating with and securing the pair of confinement structures one to the other." The only structure disclosed for *fastening mechanism* is the fastening mechanism 320, taught in Figures 16-18, 21, and 24-25. That component is shown in annotated Figure 16 (below).

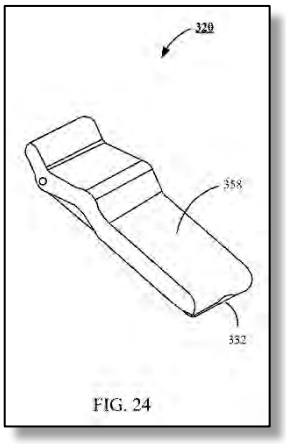


'119 patent Fig. 16 (annotated)

86. The specification explains for Figure 16 that the communication port includes a "fastening mechanism 320" that in one embodiment is "a soft draw

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latch, such as that provided by Southco" of Concordville, PA, shown in Fig. 24 below. Ex. 1001 at 8:23-27.



'119 patent Fig. 24

87. According to the specification, the fastening mechanism is fastened to the conduit via anchor member 330, which is in turn positioned adjacent to the slip fit 326, and attached to the other confinement structure via an attachment member 332. "Operation of the fastening mechanism 320, facilitates an expand and contract of the distance between the pair of confinement structures" though the use of the slip fit. *Id.* at 8:43-45, 9:42-44.

88. In my opinion, the only arguably definite structure for *fastening mechanism* based on these disclosures is limited the fastening mechanism 320 of Figures 16 and 24—the soft draw latch and slip-fit discussed in the specification. No other structure is disclosed.

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E. “Communication link" (claims 1, 13, 16)

89. In my opinion, the BRI of *communication link* as claimed is a "wired or wireless connection for passing signals between the control modules." This is what the specification describes when discussing the *communication link* and is consistent with the term's plain and ordinary meaning in my experience. Figure 14, for example, which does not teach confinement structures, shows that the structural bridge 258 "provides a communication link 270, which passing [*sic*] signals between the pair of control modules 252." Ex. 1001 at 7:15-17. It further explains that the communication link can provide a communication module 272 or a signal pathway 274 for "use in passing signal between the pair of control modules 252." *Id.* at 7:18-49 (wireless and wired communication links). For Figure 16, which added confinement structures, the communication link 312 is similarly identified as part of the communication port and either a wired connection 314 or wireless connection allowing communication between the two confinement structures and thus the control modules. *Id.* at 7:65-8:1, Fig. 16.

90. For the reasons explained above, I agree with the constructions Petitioners have proposed in these IPR proceedings.

IX. ANALYSIS OF PRIOR ART

91. There are a number of references that constitute prior art to the ‘119 patent. The primary prior art references used in the invalidity grounds are set forth

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in the table below. A description of the prior art follows. The prior art references are exhibits to the accompanying Petitions.

Prior Art Reference	Abbreviation
Schoenith, U.S. Patent No. 9,539,507 B2	“Schoenith” (Ex. 1003)
Park, Korean Patent No. 10-2011-0116892	“Park” (Ex. 1004)
Kessler, International Patent Application No. WO 2014/079264 A1	“Kessler” (Ex. 1005)
Hirschman, U.S. Patent Application Publication No. 2015/0134859	"Hirschman" (Ex. 1006)
Willner, U.S. Patent Application Publication No. 2001/0045938 A1	"Willner" (Ex. 1014)
Michael, U.S. Patent Application Publication No. 2010/0195279 A1	"Michael" (Ex. 1015)

92. In the following sections, I provide a brief summary of each of the prior art references in my analysis. Based on the filing dates and/or publication dates of the below-listed prior art, I understand each is prior art to the ‘119 patent.

A. Schoenith

93. Schoenith, entitled “APPARATUS AND METHOD FOR CONTROLLER ACCESSORY,” issued on January 10, 2017. It was filed July 11, 2014 and claims priority to provisional applications filed July 11, 2013 and September 18, 2013.

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94. Schoenith discloses a game controller apparatus that accommodates handheld smart devices such as iPhones and iPads and provides physical input controllers for use with gaming on those types of computing devices. Figure 9 of Schoenith (below) shows the controller accessory, including its right side panel, left side panel, and "cradle," which could be detachable or nondetachable. Schoenith 2:14-19. The right and left side panels were controllers that could include input controls, such as a joystick, directional pad ("d-pad"), buttons, or others, used to control a game on a smart device. Schoenith 4:40-67. Like the earlier controllers noted above that contained interchangeable controls, those input

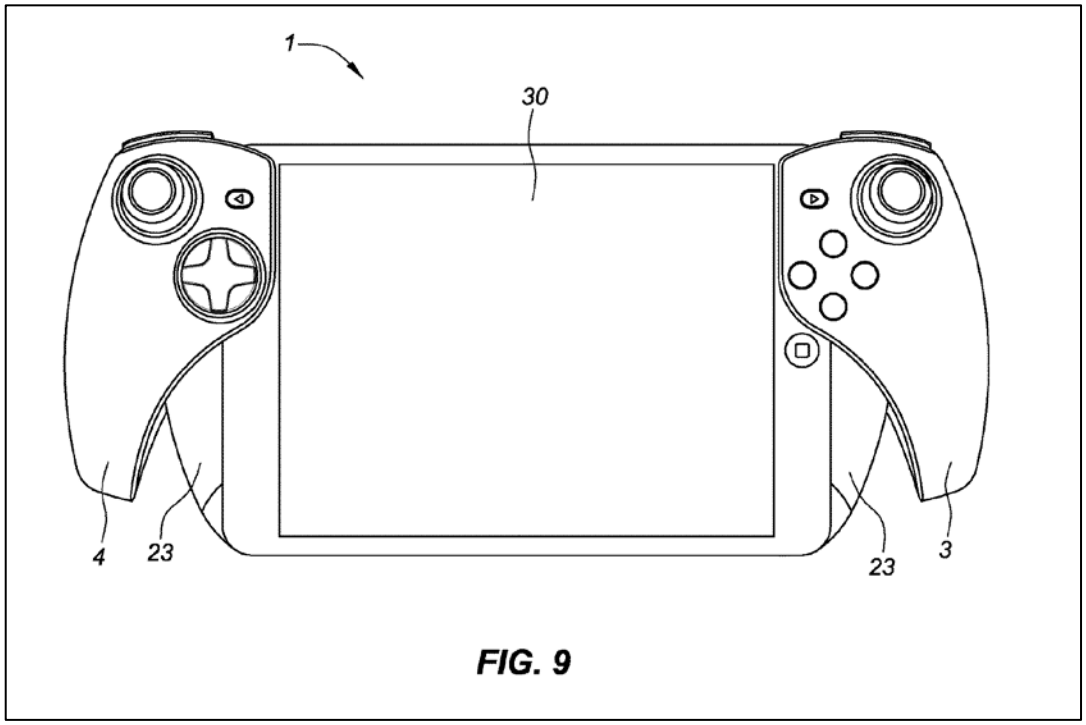


FIG. 9

controls could be "removable or non-removable, and interchangeable." Schoenith 5:45-55.

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95. Schoenith explains that its cradle could be attached to the right and left side panels and secure a handheld smart device. Schoenith 5:15-26, 6:15-20, 7:14-30, 8:21-35. The cradle could have structures to secure accommodation of the smart device such as a depression portion, slots, and/or raised walls on any of the cradle's sides. Schoenith 6:30-50, 6:55-61. It could also have "connection parts" such as snap-fits, mechanical keys, or support wings, to connect to the control panels, which had their own attachment openings or connections. Schoenith 7:14-33.

96. Schoenith's controller also had communications capabilities. It teaches that the controller could include a wireless connection such as Bluetooth or infrared LEDs for exchanging data between the smart device and the controller "in the right side panel, left side panel, the chassis, the cradle, or a combination thereof." Schoenith 7:34-41. It could also have wired connection such as a power connector (an Apple Lightening connector) and a docking port to which the device could attach via the panels or the cradle. Schoenith 7:42-66.

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B. Willner

97. Willner, entitled "HAND GRIPPABLE COMBINED KEYBOARD AND GAME CONTROLLER SYSTEM," was published on November 29, 2001. Willner discloses a hand grippable game controller that consisted of two hand grippable housings (controllers) that could be attached and detached to a computing device. They would connect to the portable computer via a separate adapter into which the computing device was held. Willner ¶ 0050. The hand grippable housings would attach to connecting portions 214 and 216 of the adaptor, which "matingly engage" with connecting portions 178, 178', 180, and 180' of the housings (e.g., pin-connectors / sockets). *Id*. ¶¶ 46, 50, 51. The housings are electrically connected to the computing device through a bus 215 / 217, as shown in Figure 8.

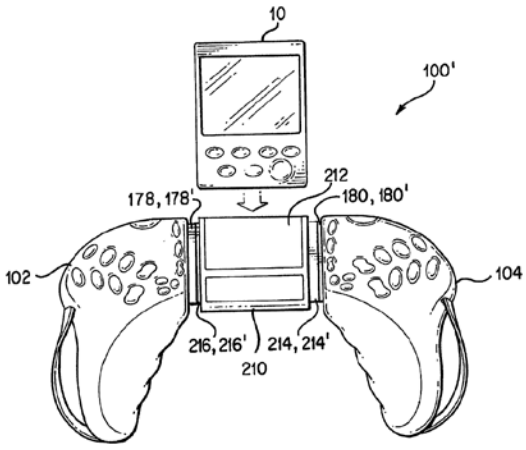


FIG. 4

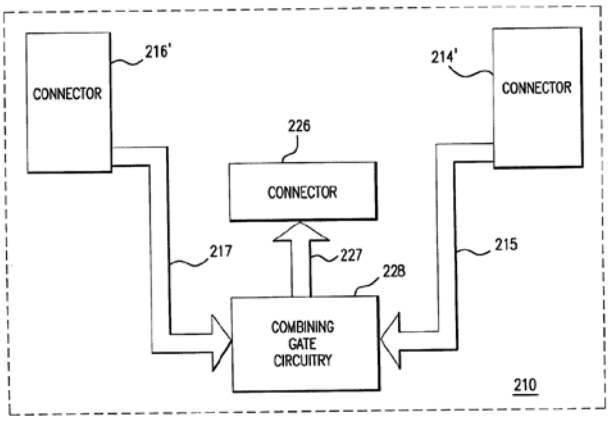


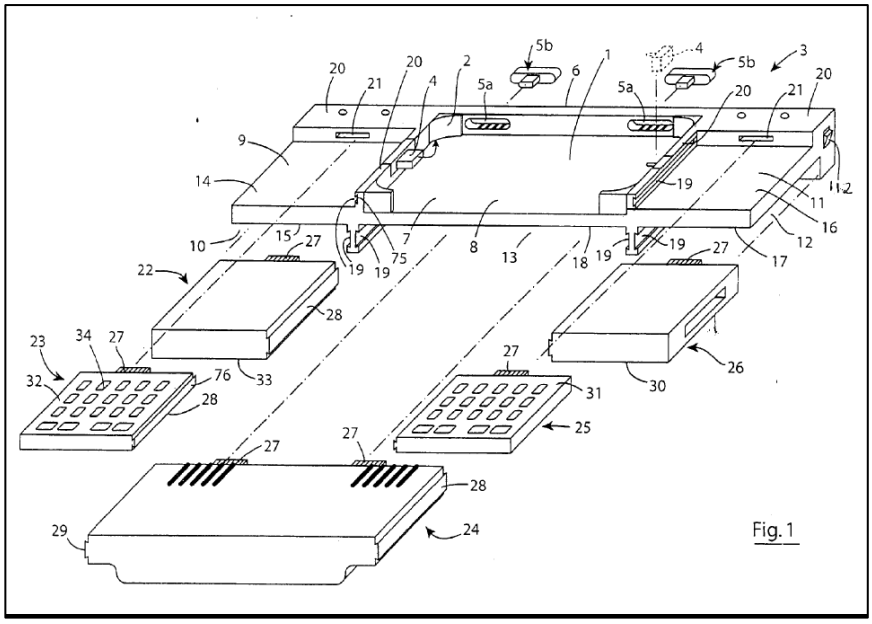
FIG.8

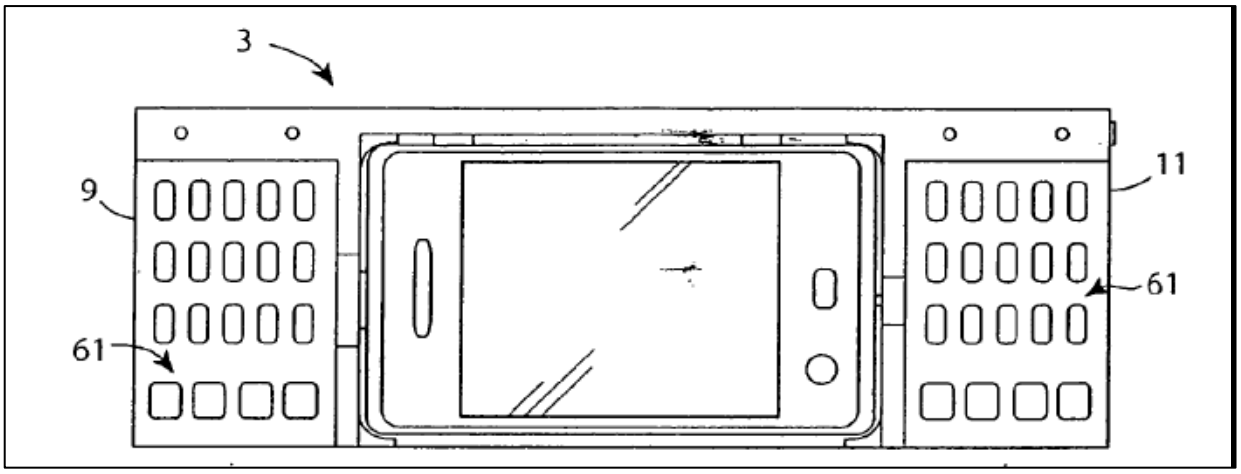
C. Michael

97. Michael, entitled "DOCKING STATION AND KIT FOR A PERSONAL ELECTRONIC DEVICE," is a U.S. patent application publication that published on August 5, 2010.

98. Michael teaches a handheld docking station that holds personal electronic devices, including mobile phones, and provides interchangeable control modules for gaming and other applications. Michael ¶¶1, 10-17. The docking station provides a cradle/frame with a defined compartment for holding a smartphone, as well as two compartments for docking interchangeable modular controls. *Id.* ¶¶10-17, 49-51, 82-83, 100. The interchangeable controls included gaming controls that provided users with the feel of a traditional game controller when gaming on the smartphone. *Id.* ¶¶17-18, 20, 35-36. Figures 1 and 5 show the device in exploded and combination views, and demonstrate how the docking/controller device interacts with the phone and interchangeable input controls.

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99. As shown, the phone is physically and electrically connected when docked on the device, giving the overall feel of a traditional gaming controller with controls on the left and right sides of the phone and controller (i.e., a landscape layout). *Id.* ¶¶125-26, 135. Each interchangeable control module attaches to the sidewalls of the docking station via guiding rails and are electrically connected to

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the device, which then communicates with the phone via the docking connector. *Id.* ¶¶17, 20, 82-83, 100, 128-29.

D. Kessler

100. Kessler, entitled "A HANDHELD APPARATUS FOR COMMUNICATING CONTROL SIGNALS TO AN INFORMATION PROCESSING DEVICE," issued on May 30, 2014. Kessler was filed on September 13, 2013, and claims priority to a foreign application filed November 23, 2012.

101. Kessler discloses another handheld game pad controller designed to hold and communicate with a computing device, such as a smart phone or tablet, and provide physical gaming controls for use with those touchscreen devices. Like Schoenith, it taught separate left and right handle housings that provide user input controls such as buttons, d-pads, or joysticks. The handle controllers were interconnected via an adjustable bridge that wrapped around the back of the smart device to hold it in place on two sides. Figure 10 and 11 show the game controller without and with a handheld computer, as the device was designed to be used.

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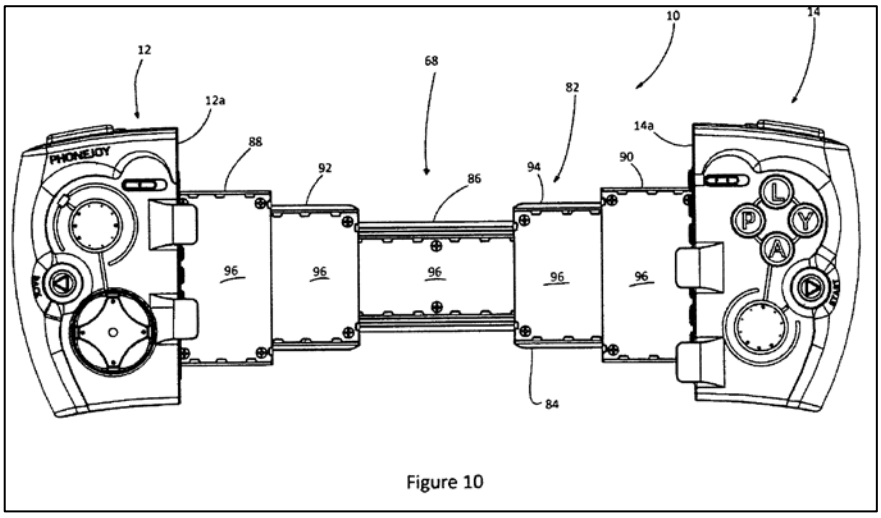


Figure 10

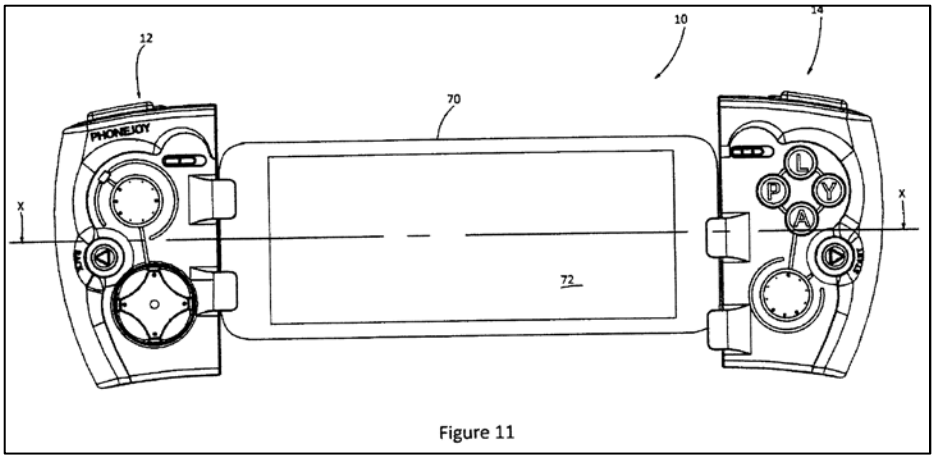


Figure 11

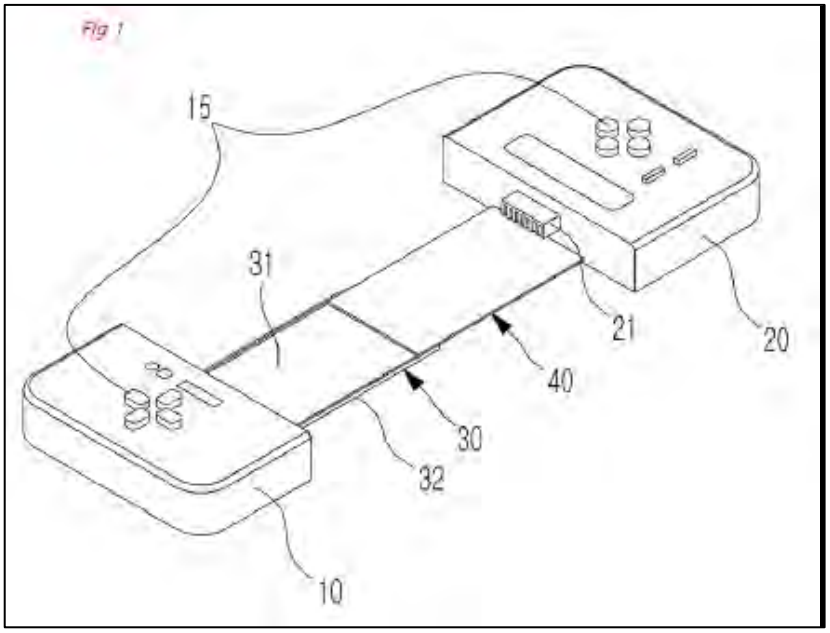
102. Each handle had control circuitry that was connected via an electrical connection means that passed through the extension mechanism (bridge). Kessler ¶¶26-27. The controller also had in each of the handles memory, a processor, and a communication module (which could be wireless or wired) capable of communicating with the smart device. Kessler ¶¶11-12, 19.

E. Park

103. Park, entitled "GAME PAD DEVICE FOR MOBILE PHONE," is a Korean application that was published on October 26, 2011.

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104. Park teaches a gamepad apparatus that was used to accommodate and allow physical gaming controls for use with a handheld computing device. Its apparatus consisted of two controller bodies—one on the left and one on the right—connected via an adjustable bridge. Park at Abstract. The device confines a mobile phone lengthwise on two sides between the raised walls of the controller bodies with the adjustable bridge supporting the back of the phone. Park ¶13. Figure 1 below shows Park's device:



105. As in Kessler, Park's left and right controller bodies are electrically connected via a cable that runs through the bridge. In Park, connecting terminal 21, which is a docking port, is provided to link the mobile phone to the bodies. The bridge contains two sliding panels with recessed guide grooves and catching holes that locks them, and thus, the confining walls of the controllers, together. Park ¶9.

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F. Hirschman

106. Hirschman, entitled "MULTI-CONFIGURATION COMPUTER," was published on May 14, 2015. Hirschman claims priority to a provisional application filed April 20, 2011. Hirschman disclosed a portable tablet computer with communication ports that interfaced with peripheral gaming controller devices on each of its four sides. As shown in Figure 20C (below), the game controllers could attach by sliding rails to the left and right sides of the computing device (lengthwise) or by other means, such as additional retention posts and ports. Each controller had input apertures and input devices, such as a joystick, d-pad, and buttons.

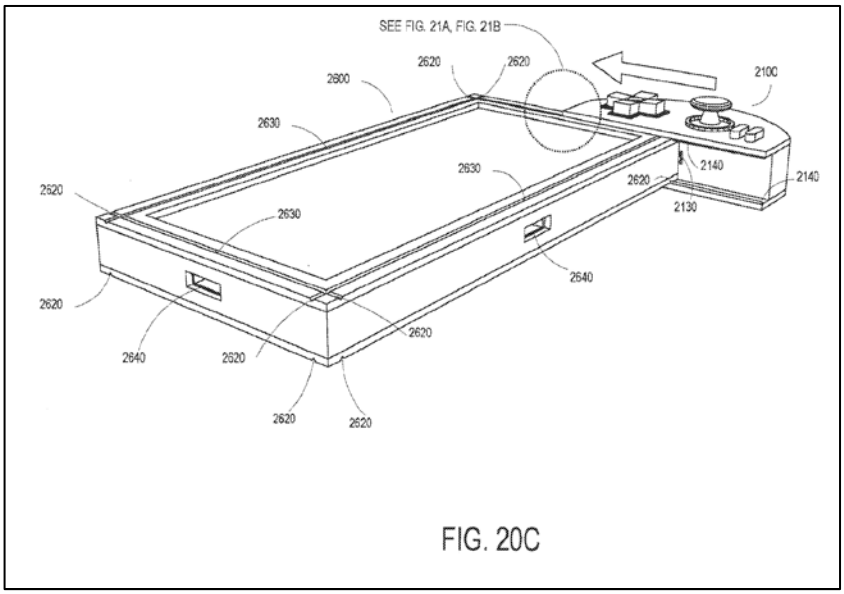


FIG. 20C

X. OBVIOUSNESS ANALYSIS

A. Obviousness Based on Schoenith in View of Kessler

107. The following section provides an analysis that demonstrates how the combination of Schoenith and Kessler renders the claims 1-10 and 13-21 obvious.

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As noted above, a POSITA would have had several reasons to combine the teachings of Schoenith and Kessler. As an initial matter, Schoenith and Kessler are each controllers designed to hold a smart phone or tablet in place and provide external control modules for use in gaming. The control modules, like all game controllers, provide buttons, joysticks, or other input devices for use in gaming. These controllers both solved a problem and satisfied market demand for products that enable a more enjoyable gaming experience on mobile touchscreen devices, as I explained above, and do so in a similar manner. Thus, a POSITA would have been knowledgeable about the teachings of both—including that the teachings of one would be applicable to the other given that they taught extremely similar devices.

1. Claim element 1(a): "A combination comprising:

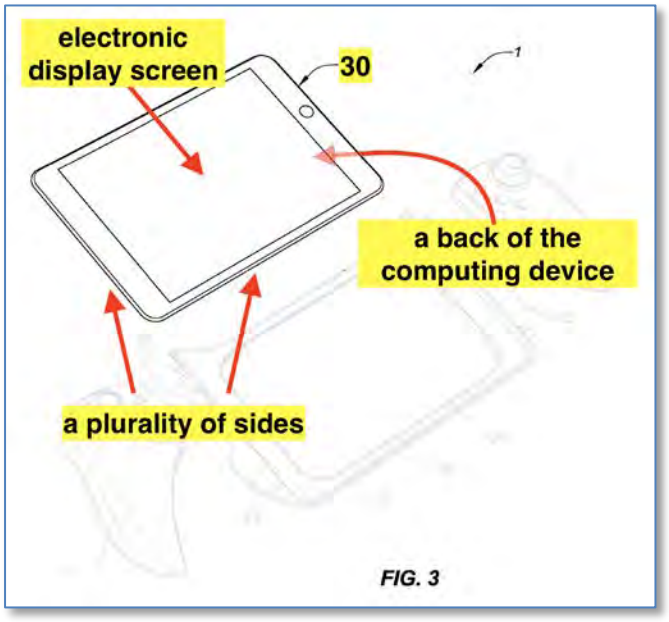
108. Schoenith, in combination with Kessler, is a combination of claimed elements, as described below.

2. Claim element 1(b): "a computing device, the computing device providing a plurality of sides, each of the plurality of sides are disposed between an electronic display screen of the computing device and a back of the computing device;"

109. Schoenith discloses a computing device, the computing device providing a plurality of sides, each of the plurality of sides [are] disposed between an electronic display screen of the computing device 30 and a back of the computing device, as shown below in an annotated version of Schoenith Fig. 3*; see*

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Schoenith 9:50-54, "FIG. 3 is a perspective view of the controller 1 of FIG. 1 illustrating the disassembled controller's right and left side panels 3, 4, the detachable cradle 20, and a smart device 30."



Schoenith Fig. 3 (annotated)

110. Kessler similarly teaches a hand-held information processing device, such as a smart-phone, to be used with its game controller accessory. Kessler ¶¶11-12, Fig. 11.

111. Therefore, Schoenith, in combination with Kessler, discloses this claim limitation.

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3. Claim element 1(c): "a communication port interacting with the computing device, the communication port providing a communication link and a pair of confinement structures, the pair of confinement structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device;"

112. Schoenith, in combination with Kessler, discloses a communication port interacting with the computing device, the communication port providing a communication link and a pair of confinement structures, the pair of confinement structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device.

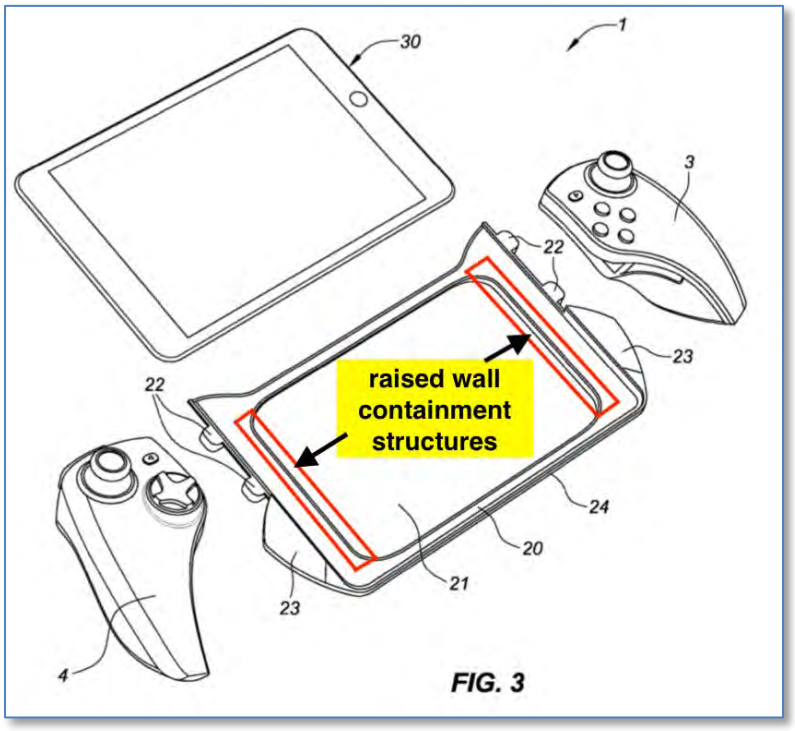
113. In particular, Schoenith discloses a device which provides a communication link; *see* Schoenith 7:35-48, "For example, the controller may include at least one **wireless connection, such as Bluetooth® or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the controller in the** right side panel, left side panel, the **chassis, the cradle, or a combination thereof**… The controller may **include at least one power connector to provide a wired connection between the smart device and the controller in the** right side panel, left side panel, **the cradle, or a combination thereof**. The at least one power connector may be any connector typically utilized to connect a smart device to a host device, such as a 30-pin dock connector or **Apple Lightning® connector**." (emphasis added); *also see* Schoenith 8:16-20, "The controller may include at least one microphone jack in the right side panel, left side

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panel, the chassis, **the cradle**, or a combination thereof. **The one or more microphone jacks may be located on** any side of the right side panel, left side panel, **the chassis, or the cradle**." (emphasis added).

114. Schoenith also discloses a cradle 20 with confinement structures in the form of "raised walls"*; see* Schoenith 6:15-33, "The cradle serves as a support for a smart device… The cradle may have other features which will enhance secure accommodation of a smart device within the cradle, such as a depression portion, one of more slots, and one or more **raised walls**…." (emphasis added). Schoenith discloses that the raised wall confinement structures are adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device 30*; see* Schoenith 6:48-50, "Preferably, **the cradle has a raised wall on the right side, left side, front side, back side**, and/or a combination thereof." (emphasis added); Schoenith 6:58-63, "support may be provided on one, two, or three sides, leaving the remaining sides free of support."

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Schoenith Fig. 3 (annotated)

115. Schoenith's structures satisfy the confinement structures limitation because they perform the same function, as required under a proper construction of that term, and the structure is physically similar to those disclosed in the '119 patent—they provide raised structures, like the device cradle in Figures 16 and 19 of the '119 patent, that confine the computing device on two sides. Schoenith's cradle (and thus the raised walls) may also have communications connections, as noted above. Thus, it is my opinion that Schoenith discloses this claim limitation in full.

116. To the extent Patent Owner asserts that Schoenith's disclosures are insufficient, Kessler discloses a similar game controller—but one in which the two controller modules are explicitly connected via an electrical cable running through

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the bridge, as in the '119 patent. A POSITA seeking an even more detailed disclosure of what Schoenith taught (a communication link between the combination of the controllers and the communication port) would thus look to Kessler's teachings to understand that one would connect the modules via the communication port, and thus provide a communication link and pair of confinement structures as claimed.

4. Claim element 1(d)(i): "an input device attached to and in electronic communication with the communication port;"

117. Schoenith, in combination with Kessler, discloses an input device attached to and in electronic communication with the communication port.

118. Schoenith discloses an input device in the form of right panel 3 and left panel 4 which attach to the cradle 20. Fig. 3 on the left shows the input devices 3 and 4, the cradle 20 and the mechanical keys 22, which physically attach the input devices to the cradle 20. Fig. 9, on the right, shows the input devices 3 and 4 attached to the cradle 20:

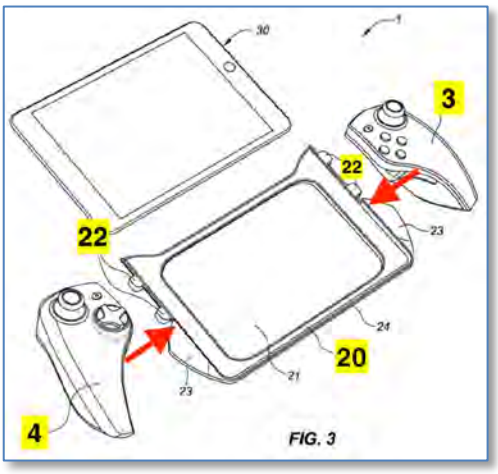


FIG. 3

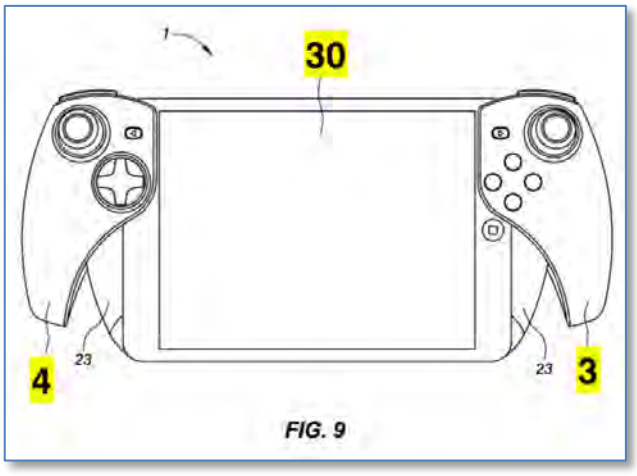


FIG. 9

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Schoenith Fig. 3 (annotated) **Schoenith Fig. 9 (annotated)**

119. Schoenith discloses an input device in the form of right panel 3 and left panel 4 which attach electronically to the cradle 20*; see* Schoenith 7:42-48, "The controller may **include at least one power connector to provide a wired connection between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof.** The at least one power connector may be any connector typically utilized to connect a smart device to a host device, such as a 30-pin dock connector or **Apple Lightning® connector**." (emphasis added). The phrase "a combination thereof" would necessarily include a scenario in which the smart device is electronically connected to the cradle, which is connected to the input device. One skilled in the art would understand that the input device must necessarily be connected to the cradle (communication port) for the system to work.

120. In one embodiment, Schoenith discloses that the input devices in the form of right panel 3 and left panel 4 are attached to and in electronic communication with the communication port, in the form of the cradle*; see* Schoenith 7:14-29, "The **cradle may have one or more connection parts** providing secure connection to the right side panel and the left side panel. The **connection can be any connection commonly utilized in controllers**, preferably a connection which allows for **easy and frequent assembly and disassembly of**

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the controller, such as a magnetic connection, a snap-fit connection, a combination thereof, or the like." (emphasis added).

121. One skilled in the art would understand the phrase "any connection commonly utilized in controllers" to include connections that are both physical and electronic in nature. See the section of this declaration entitled Background of the Invention for more information on the state of the art at the time of the '119 patent regarding attachment structures used on game controllers.

122. Schoenith also teaches that the controller can be disassembled. According to the specification, "**The controller including the right side panel, the left side panel, and the chassis can be disassembled**, the chassis can be completely removed and replaced with a detachable cradle which will accommodate and support a smart device, such as iPhone®, iPad®, iPad Mini, or the like. **The controller panels may attach directly to a smart device and may be free of any chassis or cradle**." The fact that the right and left panels were disclosed as connecting to the chassis and cradle, as well as directly to a smart device, confirms that the connection is both physical and electronic in nature.

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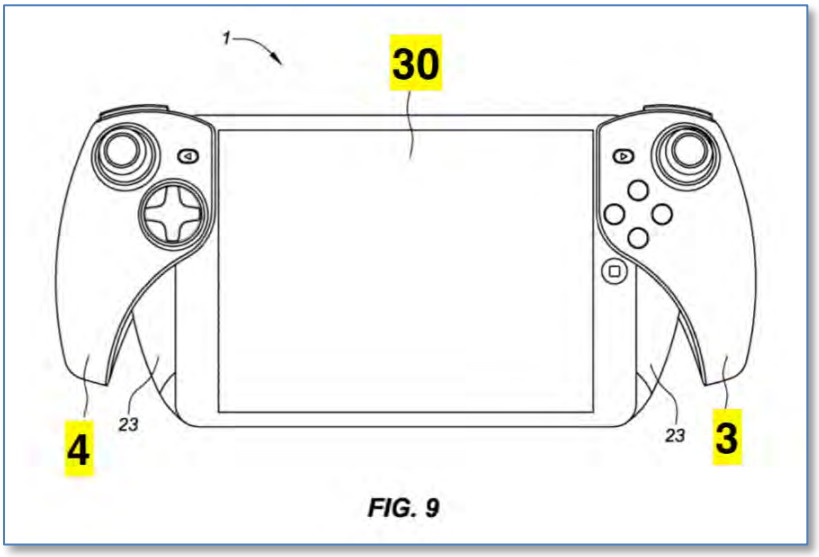
5. Claim element 1(d)(ii): "the input device providing a pair of control modules, the pair of control modules providing input module apertures, each input module aperture secures an instructional input device, wherein said input module apertures are adjacent each of the at least two opposing sides of the plurality of sides of the computing device, and wherein the input device is a separate and distinct structure from the communication port, forming no structural portion of the communication port; and"

123. Schoenith, in combination with Kessler, discloses the input device providing a pair of control modules, the pair of control modules providing input module apertures, each input module aperture secures an instructional input device, wherein said input module apertures are adjacent each of the at least two opposing sides of the plurality of sides of the computing device, and wherein the input device is a separate and distinct structure from the communication port, forming no structural portion of the communication port.

124. Schoenith discloses control modules providing input module apertures in the form of right panel 3 and left panel 4, each of which secure an instructional input device. For example, Fig. 9 of Schoenith shows right and left panels 3 and 4, which include common input devices such as buttons, a joystick and a d-pad*; see* Schoenith 5:45-50, "The right side panel, the left side panel, the chassis, or a combination thereof may include one or more controls, such as gaming controls, such as an analog stick, dual analog sticks, directional pad, arrow buttons, face action buttons, shoulder buttons, start and select buttons, on and off buttons, guide

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buttons, back buttons, central buttons, or the like"*; see also* Schoenith 10:61-64, "FIG. 14 is a perspective front view of the controller 1 as shown in FIG. 11, illustrating controls on the right side panel 3. The controls depicted are the right analog stick 6, an arrow button 10, and a set of face action buttons 9."



Schoenith Fig. 9 (annotated)

125. As one of skill in the art would understand, these types of input devices (buttons, joysticks, etc.) feed through an opening (i.e. aperture) in the plastic casing of the game accessory module. Each of the side panels provides these input module apertures, which secure an instructional input device. Fig. 14 of Schoenith, shown below, highlights the input module apertures associated with the input devices of side panel 3:

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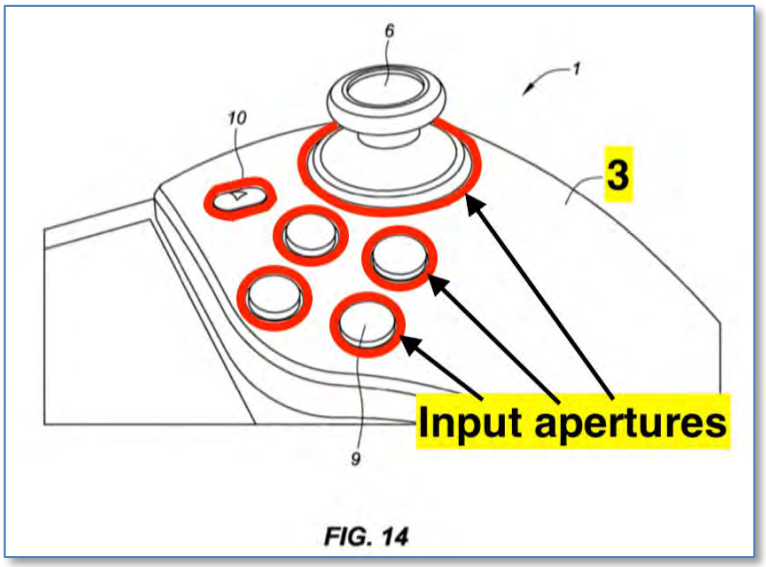
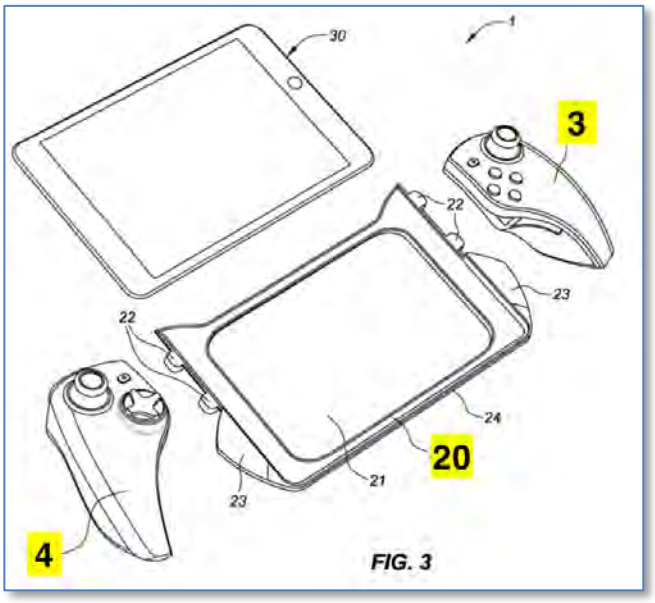


Fig. 14 Schoenith (annotated)

126. Note also that Fig. 9, shown above, illustrates that said input module apertures are adjacent to each of the at least two opposing sides of the plurality of sides of the computing device 30.

127. As shown in Fig. 3, the input devices in the form of right and left panels 3 and 4 are separate and distinct structures from the cradle 20, forming no structural portion of the cradle:

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Schoenith Fig. 3 (annotated)

128. Thus, the combination of Schoenith with Kessler teaches this claim limitation.

6. Claim element 1(e)(i): "a structural bridge securing the pair of confinement structures one to the other,"

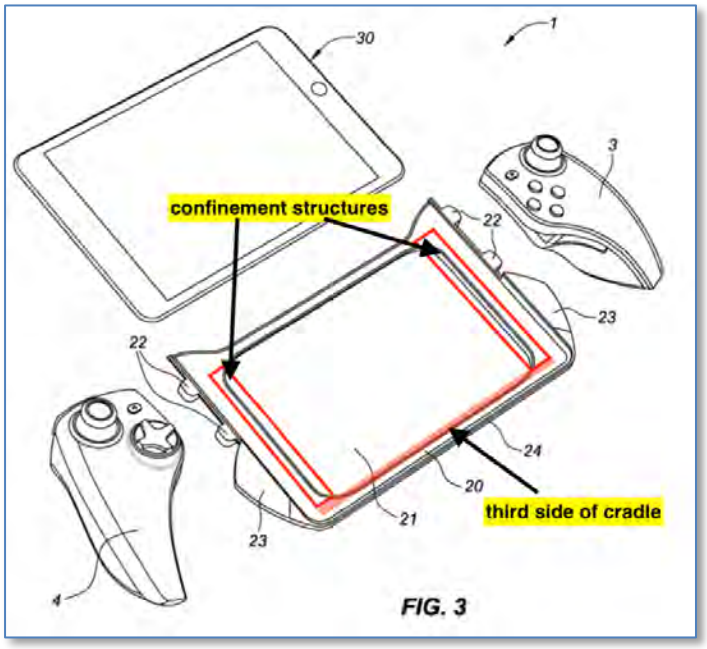
129. Schoenith, in combination with Kessler, discloses a structural bridge securing the pair of confinement structures one to the other.

130. As discussed above, Schoenith discloses confinement structures in the form of the raised walls of the cradle 20*; see* Schoenith 6:48-50, "Preferably, **the cradle has a raised wall on the right side, left side, front side, back side, and/or a combination thereof**." (emphasis added).

131. Schoenith additionally discloses a structural bridge in the form the third side of the external cradle that physically connects, and secures one to the other, the two lengthwise sides of the cradle, which provide the raised walls that

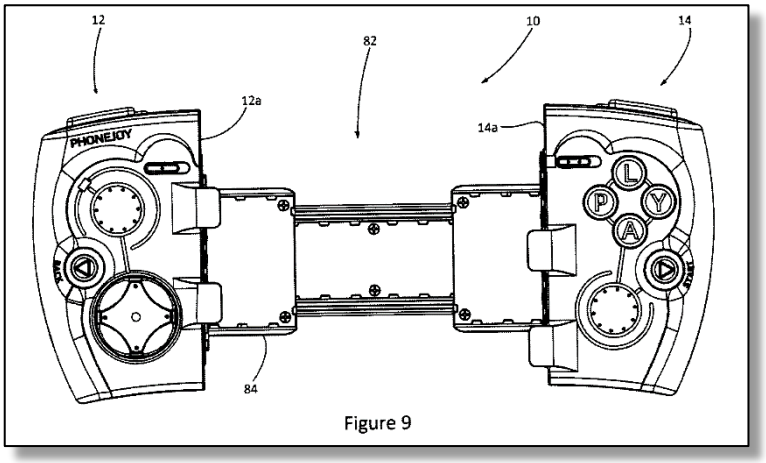
are the confinement structures. *See* Schoenith 6:15-50, 6:58-63, Figs. 3, 8-12, 17-20.

132. See Fig. 3 below:



Schoenith Fig. 3 (annotated)

133. A POSITA would also have been motivated to improve Schoenith's bridge design with the structural bridge from Kessler, which is a more robust, adjustable design. Kessler taught a structural bridge that could adjust to accommodate different size smart devices (like the '119 patent), and would work with Schoenith's design because both are designed to provide two side controllers and confinement structures via a bridge to hold a smartphone or tablet. As shown below, Kessler's connection mechanism is a structural bridge, which would be easily adapted to utilize Schoenith's two separate "raised walls," separate from the controllers, that hold the electronic device.



Kessler Fig. 9

134. As noted in more detail below (for element 1(f)(i)), the use of an adjustable bridge would have provided tangible benefits—and they were known in the prior art for use with the types of controllers disclosed by Schoenith. Their use thus would have been expected—with very predictable results.

7. Claim element 1(e)(ii): "in which each of the pair of control modules provide an attachment structure cooperating with the communication port, each attachment structure secures the input device to the communication port,"

135. Schoenith, in combination with Kessler, discloses a pair of control modules which provide an attachment structure cooperating with the communication port, each attachment structure securing the input device to the communication port.

136. Schoenith discloses controllers in the form of the right side panel 3 and left side panel 4, which provide an attachment structure cooperating with the communication port, each attachment structure securing the input device to the

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communication port*; see* Schoenith 7:14-29, "The **cradle may have one or more connection parts** providing secure connection to the right side panel and/or the left side panel. The **connection can be any connection commonly utilized in controllers**, preferably a connection which allows for **easy and frequent assembly and disassembly of the controller**, such as a magnetic connection, a snap-fit connection, a combination thereof, or the like." (emphasis added); 9:31-32 (connection, opening, or both of sides panels used to connect to cradle).

8. Claim element 1(f)(i): "and in which the structural bridge comprising: a conduit between the pair of control modules;"

137. Schoenith, in combination with Kessler, discloses a structural bridge comprising a conduit between the pair of control modules.

138. While Schoenith discloses a structural bridge in the form of either the third-side of the cradle or the back side of cradle 20, it does not disclose the structural bridge comprising a conduit between the pair of control modules.

139. First, one of ordinary skill in the art would understand that a pair of control modules (input devices) which are used simultaneously to control a game must necessarily be electronically connected for the controllers to operate properly. To that end, an electrical connection (i.e. wire or other connection technology) must necessarily ensure that the two control modules are part of the same circuit. If the control modules are physically connected together during operation (as they are

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in Schoenith), one skilled in the art would understand that a wire would be the simplest and most cost-effective way to make that connection. It would have been obvious for one of skill in the art to connect the control modules of Schoenith with a physical wire.

140. However, high volume, electronic toy products are generally engineered for endurance, as they are often handled by young children, who may not appreciate the fragility of electronic components. Therefore, it would have been obvious to one of skill in the art to connect the control modules of Schoenith with a physical wire running through a conduit, to protect the integrity of the wire. Therefore, it would have been obvious to one of skill in the art to run a conduit between the pair of control modules.

141. Kessler is an example of how one would do this. As noted above, Kessler discloses a structural bridge in the form of the extension mechanism 82, which includes an electrical connection means 112 which connects the control housings, in the form of handle housings 12 and 14*; see* Kessler ¶92, "The respective control circuitries 72, 74 of the handle housings 12, 14 are **electrically connected by an electrical connection means 112**. The electrical connection means 112 is preferably arranged to **pass through the interior of the extension mechanism 82**." (emphasis added).

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142. One of skill in the art would understand that a wire being run through a mechanically-active environment, such as the inside of a sliding, retracting and expanding bridge such as that disclosed in Kessler, would necessarily be run through a conduit to physically protect the integrity of the wire. Consequently, it would have been obvious to one of skill in the art to run a conduit through the structural bridge of Kessler to connect the first and second control modules together with a physical wire.

143. Further, it would have been obvious to apply the teachings of Kessler to Schoenith. The advantages of Kessler's adjustable bridge would have been obvious to one of skill in the art at the time of the '119 patent. At that point in the market (and before), there were dozens of mobile devices available from manufacturers such as Apple, Google, Samsung, LG and a host of companies marketing mobile devices compatible with Google's Android operating system. There is not, and was not at the time, a standard size for the height of a mobile device.[15] Apple alone (one manufacturer out of dozens in the market), had at least

[15] The height is the relevant dimension as the devices are used in a landscape mode in the inventions in question.

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9 mobile products actively being used in 2012, representing 7 different heights[16,17,18]:

Model	Release date	Height
iPhone 3GS	2009	4.5 in.
iPhone 4	2010	4.5 in.
iPhone 4s	2011	4.5 in.
iPhone 5	2012	4.87 in.
iPad 1	2010	9.55 in.
iPad 2	2011	9.49 in.
iPad 3	2012	9.49 in.
iPad mini	2012	7.87 in.
iPad 4 mini	2012	8.00 in.

144. Because of this large variety of sizes, Kessler's adjustable bridge would have an obvious enhancement to Schoenith's controller accessory. One of skill in the art would have recognized that the feature would greatly expand the number of devices that an inventor's product would support, leading to the predictable result of having a larger base of potential customers. Indeed, Schoenith recognized that different cradles could be used to this end. However, Kessler's bridge was another known way of solving the same issue, eliminating the need to

[16] http://socialcompare.com/en/comparison/apple-ipad-versions-compared-ipad-air-vs-ipad-mini, Appendix O
[17] https://www.cnbc.com/2017/06/29/every-iphone-released-in-order.html, Appendix P
[18] https://www.theiphonewiki.com/wiki/List_of_iPads, Appendix Q

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buy a new cradle for each new device, while providing the consumer benefits of convenience and cost savings.

145. Earlier in my declaration[19] in Section VII, I discuss the fact that the products disclosed in Schoenith and Kessler fall within the same category of products - *associated controller accessories for handheld gaming computing devices*. For this reason, one skilled in the art would have been motivated to apply the teachings of Kessler to Schoenith as it is an example of improving similar devices in the same way. Also, as discussed in the above Section VII, Schoenith and Kessler were both addressing the same market need. Therefore, one skilled in the art would have been motivated to attempt a combination of Kessler and Schoenith because they would be applying a known technique (the adjustable bridge) to a known device (in the same market segment) to yield a predictable result.

146. Therefore, Schoenith, in combination with Kessler, renders this claim element obvious.

[19] See Section VII.

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9. Claim element 1(f)(ii): "[the structural bridge comprising:] and a fastening mechanism cooperating with the pair of confinement structures, the fastening mechanism secures the pair of confinement structures one to the other."

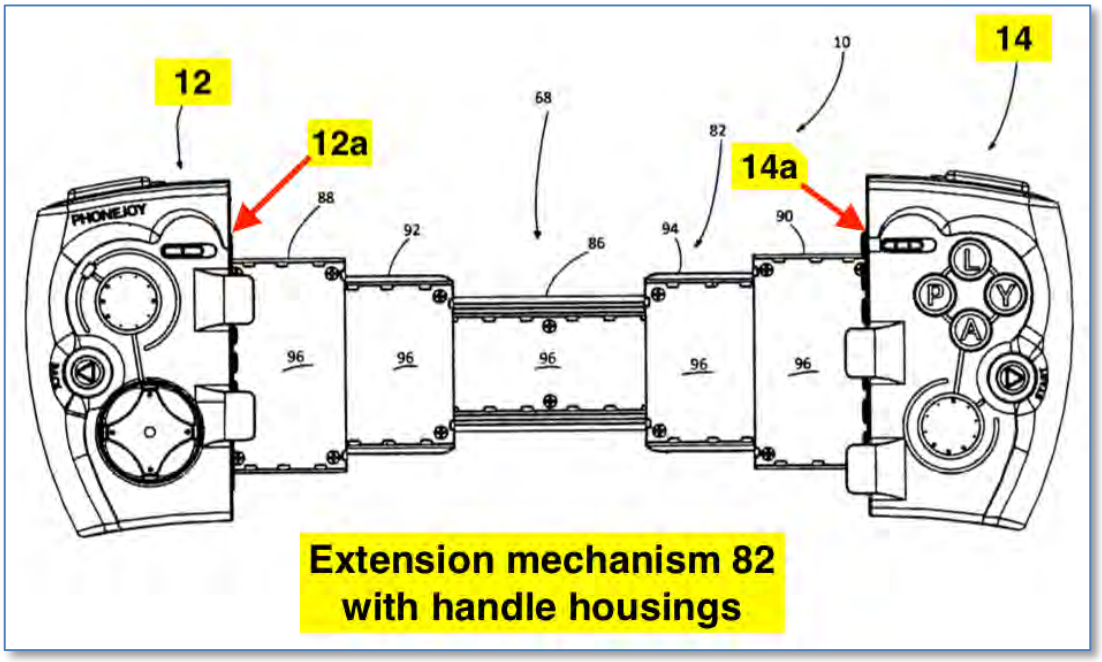
147. Schoenith, in combination with Kessler, satisfies this limitation, as explained below.

148. While Schoenith discloses a structural bridge in the form of the third side and/or the back side of cradle 20, it does not disclose the structural bridge comprising a fastening mechanism cooperating with the pair of confinement structures, the fastening mechanism securing the pair of confinement structures one to the other. Kessler also does not disclose a fastening mechanism under Nintendo's proposed construction.

149. However, a POSITA would have found it obvious to include a fastening mechanism for purposes of securing the pair of confinement structures one to the other. Kessler discloses a structural bridge in the form of the extension mechanism 82. As explained below, Kessler's extension mechanism, or bridge, contained slats that slide together via overlapping tongue/groove connections. *Id.* ¶¶90-91. Thus, while Kessler is not necessarily explicit on how its extension mechanism was fastened together, a POSITA would have understood that it *would be* fastened together, including through the use of a latch or structure such as that used in Park.

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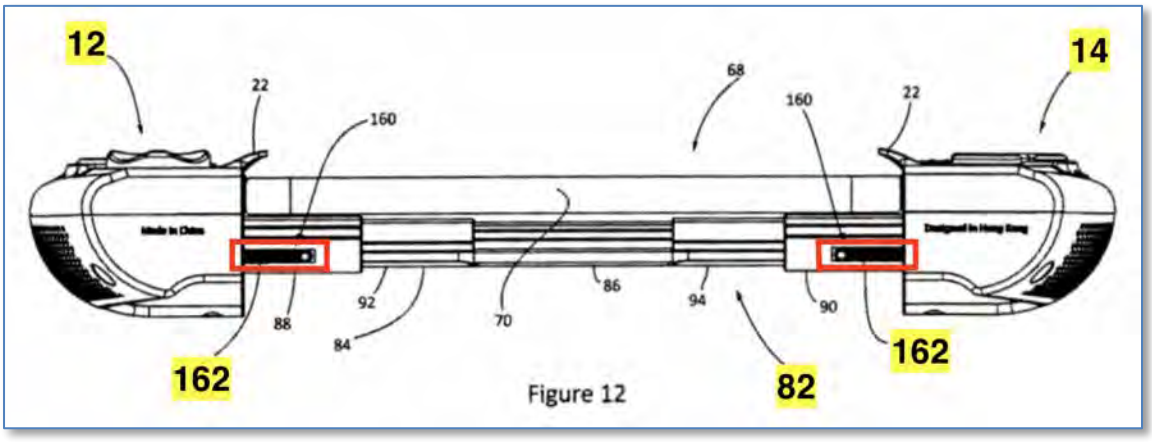
150. Under Gamevice's apparently proposed constructions, Kessler's tongue and groove connections explicitly satisfied this limitation. As shown below, the bridge connects the two side housings. See Kessler Fig. 10 below:



Kessler Fig. 10 (annotated)

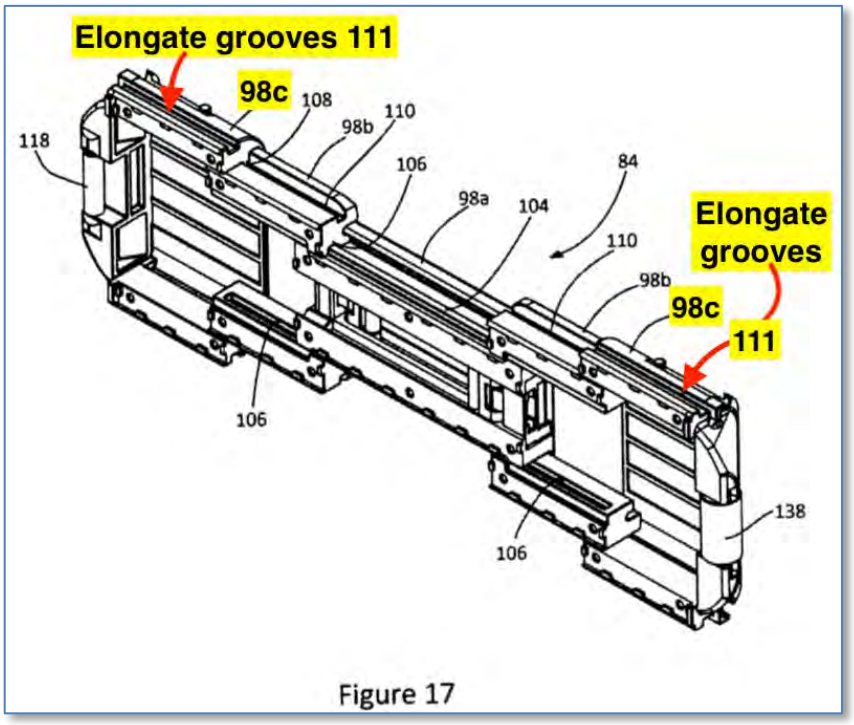
151. Kessler discloses coil springs 162 in the extension mechanism where the extension mechanism meets the housings*; see* Kessler ¶99, "… there are provided respective pairs of biasing means 160 (figure 12) in the form of **coil springs 162 attached between the handle housings 12, 14 and respective ones of the primary sections 88, 90 of the slide mechanism 84**…" (emphasis added). See Kessler Fig. 12 below:

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Kessler Fig. 12 (annotated)

152. Kessler additionally discloses that the primary slide members 98c, which are part of the extension mechanism 82, are fastened to the handle housings 12 and 14 through a tongue and groove connection, facilitated by grooves 111*; see* Kessler ¶91, "…each of the primary slide members 98c forms a tongue and groove connection with its respective one of the handle housings 12, 14. As can be seen in figure 17, each of the primary slide members 98c has elongate groves 111 formed in its outermost facing walls which, in use, engage complementary tongue structures formed within the respective handle housings 12, 14…" See Figure 17 below:



Kessler Fig, 17 (annotated)

153. Therefore, Kessler discloses the fastening mechanism element under Gamevice's overbroad construction in the form of the primary slide members 98c interacting with the elongate grooves 111. Kessler's structure is a fastening mechanism as Patent Owner appears to construe that term. At a minimum, as explained above, it would have been obvious to use a structure equivalent to the latch disclosed in the "119, as taught in Park, for example. There are a limited number of structures that can be used to fasten two components together, so the selection of one over the other is not a novel idea and, in the case of the '119 patent, serves no particular purpose.

154. In my opinion, it would have been obvious to one of skill in the art to combine the adjustable bridge of Kessler with Schoenith. The advantages of

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Kessler's adjustable bridge would have been obvious to one of skill in the art at the time of the '119 patent. As already explained, at that point in the market (and before), there were dozens of mobile devices available from manufacturers such as Apple, Google, Samsung, LG and a host of companies marketing mobile devices compatible with Google's Android operating system. There is not, and was not at the time, a standard size for the height of a mobile device.[20] Apple alone (one manufacturer out of dozens in the market), had at least 9 mobile products actively being used in 2012, representing 7 different heights[21] [22] [23]:

Model	**Release date**	**Height**
iPhone 3GS	2009	4.5 in.
iPhone 4	2010	4.5 in.
iPhone 4s	2011	4.5 in.
iPhone 5	2012	4.87 in.
iPad 1	2010	9.55 in.
iPad 2	2011	9.49 in.
iPad 3	2012	9.49 in.
iPad mini	2012	7.87 in.
iPad 4 mini	2012	8.00 in.

[20] The height is the relevant dimension as the devices are used in a landscape mode in the inventions in question.
[21] http://socialcompare.com/en/comparison/apple-ipad-versions-compared-ipad-air-vs-ipad-mini, Appendix O
[22] https://www.cnbc.com/2017/06/29/every-iphone-released-in-order.html, Appendix P
[23] https://www.theiphonewiki.com/wiki/List_of_iPads, Appendix Q

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155. Because of this large variety of sizes, Kessler's adjustable bridge would have an obvious enhancement to Schoenith's controller accessory. One of skill in the art would have recognized that the feature would greatly expand the number of devices that an inventor's product would support, leading to the predictable result of having a larger base of potential customers.

156. Earlier in my declaration[24] in Section VII, I discuss the fact that the products disclosed in Schoenith and Kessler fall within the same category of products - *associated controller accessories for handheld gaming computing devices*. For this reason, one skilled in the art would have been motivated to apply the teachings of Kessler to Schoenith as it is an example of improving similar devices in the same way. Also, as discussed in the above Section VII, Schoenith and Kessler were both addressing the same market need. Therefore, one skilled in the art would have been motivated to combine Kessler and Schoenith because they would be applying a known technique (the adjustable bridge) to a known device (in the same market segment) to yield a predictable result.

157. Therefore, Schoenith, in combination with Kessler, teaches this claim limitation.

[24] See Section VII.

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10. Dependent Claim 2: "The combination of claim 1, further comprising a data storage device confined within the input device and communicating with the computing device."

158. Schoenith, in combination with Kessler, discloses a data storage device confined within the input device and communicating with the computing device.

159. Schoenith discloses input devices in the form of the left and right side panels 3 and 4. Schoenith also discloses a computing device in the form of the smart device 30. As discussed above in my claim 1 analysis, Kessler discloses input devices in the form of the handle housings 12 and 14. Kessler also discloses a computing device in the form of the handheld information processing device 70.

160. Kessler further discloses a memory device within the handle housing which communicates with the computing device 70*; see* Kessler ¶¶ 12; 79, "**Each of the handle housings 12, 14** is provided with respective control circuitry 72, 74 (figure 19), the circuitries 72, 74 being contained within their respective handle housings 12, 14 and preferably comprising suitable components mounted on a circuit board. Each of said circuitries 72, 74 comprises **a memory 76 storing machine readable instructions**, a processor 78 for executing said machine readable instructions in order to generate control signals for said handheld information processing device 70 received in the defined space 68, **and a**

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communication module 80 for communicating any control signals generated by the processor 78 to said handheld information processing device 70."

161. Earlier in my declaration[25] in Section VII, I discuss the fact that the products disclosed in Schoenith and Kessler fall within the same category of products - *associated controller accessories for handheld gaming computing devices*. For this reason, one skilled in the art would have been motivated to apply the teachings of Kessler to Schoenith as it is an example of improving similar devices in the same way. Also, as discussed in the above Section VII, Schoenith and Kessler were both addressing the same market need. Therefore, one skilled in the art would have been motivated to attempt a combination of Kessler and Schoenith because they would be applying a known technique (the use of a data storage device) to a known device (in the same market segment) to yield a predictable result. Also, given the similarities between the two inventions, one of ordinary skill in the art would be motivated to apply Kessler's teachings regarding the use of a data storage device to Schoenith as it would be low risk and would be likely to yield predictable results.

162. Therefore, Schoenith in combination with Kessler, renders this claim obvious.

[25] See Section VII.

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11. Dependent Claim 3: "The combination of claim 1, further comprising an auxiliary power source confined within the input device and communicating with the computing device."

163. Schoenith, in combination with Kessler, discloses an auxiliary power source confined within the input device and communicating with the computing device.

164. As discussed above in my claim 1 analysis, Schoenith discloses input devices in the form of the left and right side panels 3 and 4. Schoenith also discloses a computing device in the form of the smart device 30.

165. Schoenith further discloses power storage/batteries to power its operation, and that the docking port enabled charging of the smart device while it was in the controller*; see* Schoenith 7:49-67. Kessler similarly teaches that the handle housings could contain a power supply. Kessler ¶93. Additionally, a POSITA would have been motivated to include an auxiliary power source, such as a rechargeable battery, in a detachable input device in communication with a computing device, as battery-powered, detachable input devices which could be recharged by the computing device were well known in the art since at least 2005.[26] And of course, this claim recites nothing more than using known

[26] HowStuffWorks article on Xbox 360 Wireless Controller with rechargeable battery pack © 2005 - https://electronics.howstuffworks.com/xbox-three-sixty5.htm, Appendix Y

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components (power sources) as intended to achieve predictable results (powering a device).

166. Therefore, Schoenith, in combination with Kessler, renders this claim obvious.

12. Dependent Claim 4: "The combination of claim 1, in which the instructional input device is a removable input device, and in which the removable input device passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

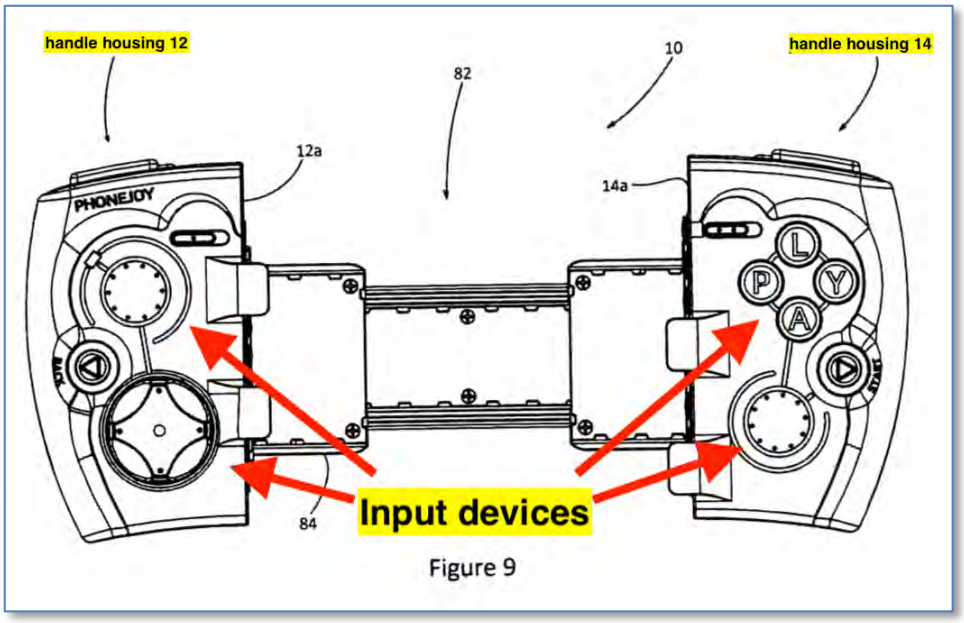
167. Schoenith, in combination with Kessler, discloses an instructional input device which is a removable input device, and in which the removable input device passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device.

168. First, Schoenith teaches that the instructional input devices, or buttons, joysticks, etc., "may be backlit, removable or non-removable, and interchangeable." Schoenith 5:55-56. Schoenith also taught that its controls were used to control a game application on the hand-held device (1:21-62) and that it had connections "for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof." *Id*. at 7:35-41 (emphasis added). It likewise taught that wired connections, such as a docking connector, were provided between the smart device

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and the controller in the panels, the cradle, or a combination thereof. Schoenith 7:42-47. Thus, the controls could pass signals from the removable input devices through the communication port (or cradle) and then to the smart device.

169. Kessler similarly discloses an input device comprised of two control modules in the form of left and right handle housings 12 and 14, each of which secure an instructional input device. For example, Fig. 9 of Kessler shows left and right handle housings 12 and 14, which include common video game input devices (or instructional input devices) such as buttons, a joystick and a d-pad.



Kessler Fig. 9 (annotated)

170. Kessler discloses that the instructional input device passes signals through the communication port to the computing device. See my analysis for claim element 1(d)(i) regarding "an input device attached to and in electronic communication with the communication port." The signals from the instructional

input devices necessarily would be sent from the control modules to the communication port.

171. Kessler further discloses that the signals from the instructional input devices control images displayed on the display screen of the computing device*; see* Kessler ¶93, "The game pad apparatus 10 contains control circuitry and a communications module whereby the game pad apparatus 10 can generate control signals and communicate these via a short range wireless protocol to the smart phone 70 **in order to exert some control on a game or other application running on the smart phone 70**." (emphasis added).

172. Therefore, Schoenith, in combination with Kessler, renders this claim obvious.

13. Dependent Claim 5: "The combination of claim 1, in which the instructional input device is a game control module, and in which the game control module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

173. Schoenith, in combination with Kessler, discloses an instructional input device which is a game control module, and in which the game control module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device.

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174. As discussed in my analysis for claim 4, both Schoenith and Kessler disclose an instructional input device which passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device. One of ordinary skill in the art would have recognized the left and right handle housings or controller panels contain input controls that are game control modules—they are input buttons, d-pads, and joysticks (among others) that are specifically provided for controlling gaming applications. Consequently, both Schoenith and Kessler disclose an instructional input device which is a game control module, and in which the game control module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device.

175. Therefore, Schoenith, in combination with Kessler, renders this claim obvious.

14. Dependent Claim 6: "The combination of claim 1, in which the instructional input device is a keyboard module, and in which the keyboard module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

176. Schoenith, in combination with Kessler, renders this claim obvious. As discussed above in my claim 1 analysis, Schoenith discloses input devices in the form of the left and right side panels 3 and 4. Schoenith also discloses a

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computing device in the form of the smart device 30. As discussed above in my analysis of dependent claim 5, and Kessler each disclose an instructional input device which passes signals through the communication port to the computing device, with those signals controlling images displayed on the display screen of the computing device.

177. While Schoenith does not explicitly disclose a keyboard module as an input device, one of skill in the art would have understood that Schoenith's disclosure was not limited to the specific input devices described in the specification, as it discloses a variety of controls that can be used*; see* Schoenith 5:45-67 (controller could provide "one or more controls"); *see also* Schoenith 11:30-38, "Although the controller described herein includes illustrations relating to its use with an e-reader/tablet style device such as the iPhone®, iPad®, and iPad Mini (available from Apple, Inc., Cupertino, Calif.), it is understood that **the controller can be formed in alternative sizes, shapes and configurations to serve as a controller having the described features and utilities for other electronic devices** such as smart phones, MP3 players, **computing devices**, and other popular electronic devices." In fact, the disclosure "**computing devices**" can be interpreted to cover a keyboard module, which is the primary control of a computing device. (emphasis added).

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178. Schoenith further confirms the embodiments as described "are not restrictive," and that "[m]any embodiments as well as many applications besides the examples provided will be apparent to those of skill in the art upon reading the above description," *see* Schoenith 12:16-19.

179. Kessler likewise teaches that a variety of input controls could be used. Kessler ¶73 (user input means could comprise any of d-pad, joy-stick, or "one or more push buttons").

180. In my opinion, based on the above and a POSITA's knowledge, it would have been obvious to one of ordinary skill in the art to include a keyboard module as an instructional input device in the combination of Schoenith with Kessler. A keyboard module is nothing more than a known user input means that has a combination of buttons or controls. Its use in the claimed context was known and would produce predictable results.

181. Therefore, Schoenith, in combination with Kessler, renders this claim obvious.

15. Dependent Claim 7: "The combination of claim 4, in which the removable instructional input device is a removable game control module."

182. The combination of Schoenith with Kessler combination renders this claim obvious for the same reasons as claims 4 and 5. As explained above, Schoenith teaches that its buttons, joysticks, or input controls, which are

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instructional input devices, or game control modules, "may be backlit, removable or non-removable, and interchangeable." Schoenith 5:55-56. Kessler likewise provided similar input controls that enabled control of a game running on a smart device. Kessler ¶¶11-12. A POSITA would have understood that Schoenith's and Kessler's input controls (buttons, d-pads, joysticks) are game control modules that, as taught in Schoenith, can be removable and interchangeable.

16. Dependent Claim 8: "The combination of claim 4, in which the removable instructional input device is a removable keyboard module."

183. Claim 8 would have been obvious for the same reasons explained for claims 4 and 6. As explained above, Schoenith taught removable and/or interchangeable instructional input devices. Schoenith 5:55-56. Use of a keyboard module—a different type of known input means for its intended purpose, to provide user input—would have been obvious to a POSITA in light of Schoenith's and Kessler's teachings that a variety of input controls could be used.

17. Dependent Claim 9: "The combination of claim 1, in which the structural bridge is a ridged structure."

184. Schoenith, in combination with Kessler, discloses a structural bridge which is a "ridged" (which I assume is a typographical error and should be rigid) structure and renders this claim obvious.

185. As discussed above, Schoenith discloses a structural bridge in the form of the third side of or the back wall of cradle 20. Schoenith further discloses

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that the cradle is a rigid structure*; see* Schoenith 8:43-47, "A secure accommodation of a smart device in a **detachable or undetachable cradle may require materials offering requisite rigidity** such as polymeric materials including but not limited to thermoplastics, thermoset plastics, elastomeric materials or any combination thereof." (emphasis added). Kessler similarly taught that its bridge comprised slide sections of molded plastics and a sheet metal cover plate, which provided a rigid structure as the structural bridge. Kessler ¶89.

18. Dependent Claim 10: "The combination of claim 9, in which the rigid structural bridge is a removable rigid structure."

186. Schoenith, in combination with Kessler, discloses the rigid structural bridge as a removable rigid structure and renders this claim obvious.

187. As discussed above, Schoenith discloses a ridged structural bridge. Schoenith further discloses that the structural bridge is a removable rigid structure; *see* Schoenith, 7:14-16, "The cradle may be attached to the right side panel on the right side and the left side panel on the left side. **The cradle may be detachable**." In the combination—with Kessler's structural bridge linking the confinement structures as taught in Schoenith—the rigid structural bridge would accordingly be a removable rigid structure.

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19. Dependent Claim 13: "The combination of claim 1, in which the communication link is a signal pathway."

188. Schoenith, in combination with Kessler, discloses a communication link which is a signal pathway.

189. Schoenith discloses a device which provides a communication link; *see* Schoenith 7:35-40, "For example, the controller may include at least one **wireless connection, such as Bluetooth® or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof**..." (emphasis added).

190. Schoenith also discloses wired communication links*; see* Schoenith 7:42-48, "The controller may include at least one power connector to provide a **wired connection between the smart device and the controller in the right side panel, left side panel, the cradle, or a combination thereof**. The at least one power connector may be any connector typically utilized to connect a smart device to a host device, such as a 30-pin dock connector or **Apple Lightning® connector**." (emphasis added)*; see also id*. 8:16-20, "The controller may include at least one microphone jack in the right side panel, left side panel, the chassis, the cradle, or a combination thereof. The one or more microphone jacks may be located on any side of the right side panel, left side panel, the chassis, or the cradle."

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191. One of ordinary skill in the art would understand the wired communication link to be a signal pathway, as the circuit is disclosed to include the Apple Lightning connector, the primary hard-wired data communications port for Apple mobile devices. Because Schoenith taught that a wired connection could be provided between a combination of the side panels, cradle, and the smart device, there necessarily existed a wired communication link, which is a signal pathway.

192. Kessler also provided a communication link in the form of a flexible circuit that enabled communication between the two controller modules and for power to be passed between then. That flexible circuit could be a "flexible circuit board, a flat multi-wire electrical connector or any suitable electrical power and signal connection means." Kessler ¶93.

193. Therefore, Schoenith, in combination with Kessler, renders this claim obvious.

20. Dependent Claim 14: "The combination of claim 13, in which the signal pathway is a metallic pathway."

194. Schoenith, in combination with Kessler, discloses a signal pathway which is a metallic pathway.

195. In the previous claim analysis, I discuss Schoenith's disclosure of a wired communication link which is a signal pathway. One skilled in the art would understand that a wire is a metallic conductor. Further, a POSITA would know that the use of a metallic pathway, or wire, is a known design option that would be

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used as expected (to provide a pathway for signals) to produce entirely predictable results (transmission of signals).

196. Therefore, Schoenith, in combination with Kessler, renders this claim obvious.

21. Dependent Claim 15: "The combination of claim 13, in which the signal pathway is a fiber optic pathway."

197. Schoenith, in combination with Kessler, discloses a signal pathway which is a fiber optic pathway.

198. As discussed above, Schoenith discloses both wired and wireless signal pathways, using technologies and communications protocols "such as" Apple Lightning, audio transmission, Bluetooth® or infrared light-emitting diodes (LEDs)*; see* Schoenith 7:42-48, 7:35-40, 8:16-20. Schoenith also discloses potential applications for the device, including "voice and video communication" and "digital media extenders" (*see* Schoenith 4:32-39), applications which would be greatly enhanced by the use of a fiber optic pathway. Similarly, Kessler teaches that its electrical connection means could be a multi-wire electrical connector or "any suitable electrical power and signal connection means." Kessler ¶93.

199. In my opinion, it would have been obvious to one of ordinary skill in the art to consider signal transmission via fiber optic as another option in Schoenith's open-ended disclosure of communication standards and protocols and in Kessler's similarly broad disclosure of "any suitable" connection means.

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Schoenith's mention of video, voice and digital media data would motivate one of ordinary skill in the art to consider fiber optic as an alternate approach to signal transmission. Consequently, in my opinion, Schoenith and Kessler teach a signal pathway which could be a fiber optic pathway.

200. Therefore, Schoenith, in combination with Kessler, renders this claim obvious. The Schoenith/Kessler combination takes the form, for example, of a fiber optic cable running through an adjustable bridge.

22. Dependent Claim 16: "The combination of claim 1, in which the communication link provides a communication platform."

201. Schoenith, in combination with Kessler, discloses a communication link which provides a communication platform.

202. As discussed above, Schoenith discloses both wired and wireless communication links*; see* Schoenith 7:42-48, "The controller may include at least one power connector to provide a **wired connection between the smart device and the controller in the right side panel, left side panel, the cradle, or a combination thereof**. The at least one power connector may be any connector typically utilized to connect a smart device to a host device, such as a 30-pin dock connector or **Apple Lightning® connector**." *also see id.* 7:35-40, "For example, the controller may include at least one **wireless connection, such as Bluetooth® or infrared light-emitting diodes (LEDs) for exchanging data between the**

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smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof..." (emphasis added). Kessler similarly taught that its controllers could contain a "communications module" for communicating control signals via "short range wireless protocol to smart phone 70…" Kessler ¶102.

203. In light of these disclosures, a POSITA would have found it obvious for the communication link to provide a communication platform.

23. Dependent Claim 17: "The combination of claim 16, in which the communication platform is a wired communication module."

204. Schoenith, in combination with Kessler, discloses a communication platform which is a wired communication platform.

205. As discussed above in claim 16, Schoenith discloses a wired communication platform*; see* Schoenith 7:42-48, "The controller may include at least one power connector to provide a **wired connection between the smart device and the controller in the right side panel, left side panel, the cradle, or a combination thereof**. The at least one power connector may be any connector typically utilized to connect a smart device to a host device, such as a 30-pin dock connector or **Apple Lightning® connector**."

206. Therefore, Schoenith, in combination with Kessler, renders this claim obvious.

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24. Dependent Claim 18: "The combination of claim 16, in which the communication platform is a wireless communication platform."

207. Schoenith, in combination with Kessler, discloses a communication platform which is a wireless communication module.

208. As discussed above in claim 16, Schoenith discloses a wireless communication module*; see* Schoenith 7:35-40, "For example, the controller may include at least one **wireless connection, such as Bluetooth® or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof**..." (emphasis added). Kessler similarly taught that its controllers could contain a "communications module" providing wireless communication. Kessler ¶102

209. In light of these disclosures, Schoenith, in combination with Kessler, renders this claim obvious. A Schoenith/Kessler combination would take the form of, for example, the wireless component, as taught in Schoenith, implemented in an adjustable bridge, as taught by Kessler, so that the detachable controllers of Schoenith would be in wireless communication with components comprising the adjustable bridge, which in turn would interact with the computing device and communicate with the detachable controllers.

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25. Dependent Claim 19: "The combination of claim 18, in which the wireless communication platform operates in a frequency range of 2.4 GHz."

210. Schoenith, in combination with Kessler, discloses a communication platform which is a wireless communication platform which operates in a frequency range of 2.4 GHz.

211. As discussed above in claim 16, Schoenith discloses a wireless communication platform*; see* Schoenith 7:35-40, "For example, the controller may include at least one **wireless connection, such as Bluetooth® or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof**..." (emphasis added). Kessler also teaches the use, generally, of a "short range wireless communication protocol," citing Bluetooth and WiFi as examples. Kessler ¶¶19, 80

212. As one of ordinary skill in the art would know, Bluetooth wireless technology and Wifi utilize the 2.4 GHz frequency range for transmission*; see* Wired.com[27], "**You live your life at 2.4 GHz**. **Your router**, your cordless phone, **your Bluetooth earpiece**, your baby monitor and your garage opener all love and live on this radio frequency, and no others." (emphasis added)

[27] https://www.wired.com/2010/09/wireless-explainer/, Appendix R

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213. Therefore, Schoenith, in combination with Kessler, renders this claim obvious. The Schoenith/Kessler combination would take the form of, for example, a wireless Bluetooth component, as taught in Schoenith, implemented in an adjustable bridge, as taught by Kessler, so that the detachable controllers of Schoenith would be in wireless communication with components comprising the adjustable bridge, which in turn would interact with the computing device and communicate with the detachable controllers .

26. Dependent Claim 20: "The combination of claim 18, in which the wireless communication platform is a personal area network."

214. Schoenith, in combination with Kessler, discloses a wireless communication platform which is a personal area network.

215. As discussed above in claim 16, Schoenith discloses a wireless communication platform*; see* Schoenith 7:35-40, "For example, the controller may include at least one **wireless connection, such as Bluetooth® or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof**..." (emphasis added). Kessler likewise teaches the use of a wireless connection via Bluetooth or Wifi. Kessler ¶¶19, 80.

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216. A *personal area network*, or PAN, is a computer network organized around an individual person, which is set up for personal use only.[28] Personal area networks are generally used to transmit data between nearby devices (i.e. peer-to-peer[29]), such as computers, phones, printers, game systems, game controllers and tablets. Personal area networks are often deployed with Bluetooth, though they can also be connected through a wireless (wifi) network.

217. In light of Schoenith's and Kessler's disclosures, a POSITA would understand that they teach that the communication platform would include a personal area network. The Schoenith/Kessler combination would take the form of, for example, a wireless Bluetooth component, as taught in Schoenith, implemented in an adjustable bridge, as taught by Kessler, so that the detachable controllers of Schoenith would be in wireless communication with components comprising the adjustable bridge, thus forming a personal area network. Therefore, Schoenith, in combination with Kessler, renders this claim element obvious.

[28] https://www.lifewire.com/definition-of-pan-817889, Appendix S
[29] peer-to-peer – "denoting or relating to computer networks in which each computer can act as a server for the others, allowing shared access to files and peripherals without the need for a central server." Google Dictionary, Appendix T

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27. Dependent Claim 21: "The combination of claim 18, in which the wireless communication platform utilizes infrared technology for data transactions."

218. Schoenith, in combination with Kessler, discloses a wireless communication platform which utilizes infrared technology for data transactions.

219. As discussed above in claim 16, Schoenith discloses a wireless communication platform*; see* Schoenith 7:35-40, "For example, the controller may include at least one **wireless connection,** such as Bluetooth® **or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof**..." (emphasis added).

220. Therefore, Schoenith, in combination with Kessler, renders this claim element obvious.

28. Summary

221. In summary, based on the above analysis, it is my opinion that Schoenith, in combination with Kessler, renders obvious each of claims 1-10 and 13-21 of the '119 patent.

B. Obviousness Based on Schoenith in View of Park

222. The following sections provide an analysis that demonstrates how the combination of Schoenith and Park renders the claims 1, 3-10 and 13-21 obvious. As noted above, a POSITA would have had several reasons to combine the teachings of Schoenith and Park. Schoenith and Park, like the other references

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noted above, are each controllers designed to hold a smart phone or tablet in place and provide external control modules for use in gaming. The control modules, like all game controllers, provide buttons, joysticks, or other input devices for use in gaming. These controllers both solved a problem and satisfied market demand for products that enable a more enjoyable gaming experience on mobile touchscreen devices, as I explained above. Thus, a POSITA would have been knowledgeable about the teachings of both—including that the teachings of one would be applicable to the other given that they taught extremely similar devices.

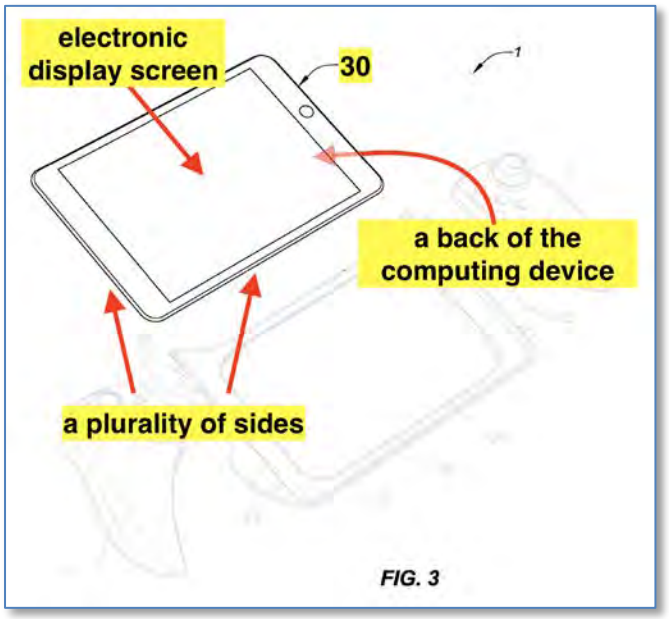
1. Claim element 1(a): "A combination comprising:

223. Schoenith, in combination with Park, is a combination of claimed elements, as described below.

2. Claim element 1(b): "a computing device, the computing device providing a plurality of sides, each of the plurality of sides are disposed between an electronic display screen of the computing device and a back of the computing device;"

224. Schoenith discloses a computing device 30, the computing device providing a plurality of sides, each of the plurality of sides [are] disposed between an electronic display screen of the computing device 30 and a back of the computing device, as shown below in an annotated version of Schoenith Fig. 3*; see* Schoenith 9:50-54, "FIG. 3 is a perspective view of the controller 1 of FIG. 1 illustrating the disassembled controller's right and left side panels 3, 4, the detachable cradle 20, and a smart device 30."

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Schoenith Fig. 3 (annotated)

225. Park also disclosed a mobile-phone that had an electronic display screen, a plurality of sides that were disclosed between the display and the back of the device. Park Abstract, ¶¶1-2.

3. Claim element 1(c): "a communication port interacting with the computing device, the communication port providing a communication link and a pair of confinement structures, the pair of confinement structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device;"

226. Schoenith, in combination with Park, discloses a communication port interacting with the computing device, the communication port providing a communication link and a pair of confinement structures, the pair of confinement structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device.

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227. Schoenith's disclosures are discussed above in §X.A.3 with regards to this claim element. As described in more detail there, Schoenith discloses a device which provides a communication link in the form of wireless or wired connections*; see* Schoenith 7:35-48, 8:16-20. *See supra* §X.A.3. Schoenith further discloses a cradle 20 with confinement structures in the form of "raised walls," as explained above*; see* Schoenith 6:15-33. *See supra* §X.A.3. Schoenith's raised wall confinement structures are adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device 30*; see* Schoenith 6:48-50.

228. To the extent it is argued that Schoenith's disclosures are insufficient, Park disclosed a similar game controller, but one in which the two controller modules were explicitly connected via an electrical cable running through the bridge, as in the '119 patent; *see* Park ¶36, describing "[a] connecting cable for electrically connecting the first body and second body" that runs "inside of the bridge". It also disclosed a connection directly to the smart phone. One skilled in the art who was seeking an even more detailed disclosure of what Schoenith already provided would look to Park. That reference showed how one would connect the modules via the communication port providing a communication link in the form of a wired connection.

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4. Claim element 1(d)(i): "an input device attached to and in electronic communication with the communication port;"

229. Schoenith, in combination with Park, discloses an input device attached to and in electronic communication with the communication port.

230. Schoenith teaches this claim element for the reasons explained above in §§XX. In short, Schoenith discloses an input device in the form of right panel 3 and left panel 4 which attach to the cradle 20 both physically and electrically; *see* Schoenith 7:14-29, 7:42-48, Fig. 3, 9.

231. Park also teaches the claimed input device in the form of a pair of control modules that contain input devices (buttons, d-pad). Park ¶¶19, 26-27, 29, Figs. 1. Signals from those input devices were communicated via the electrical connection in the bridge and the docking port in the side body—thus, via the communication port.

232. In light of these disclosures, Schoenith, in combination with Park, renders this claim element obvious.

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5. Claim element 1(d)(ii): "the input device providing a pair of control modules, the pair of control modules providing input module apertures, each input module aperture secures an instructional input device, wherein said input module apertures are adjacent each of the at least two opposing sides of the plurality of sides of the computing device, and wherein the input device is a separate and distinct structure from the communication port, forming no structural portion of the communication port; and"

233. Schoenith, in combination with Park, teaches this claim limitation.

234. As explained above, Schoenith discloses control modules providing input module apertures in the form of right panel 3 and left panel 4, each of which secure an instructional input device. For example, Fig. 9 of Schoenith shows right and left panels 3 and 4, which include common input devices such as buttons, a joystick and a d-pad*; see* Schoenith 5:45-50, 10:61-64, Fig 14.

235. As one of skill in the art would understand, these types of input devices (buttons, joysticks, etc.) feed through an opening (i.e. aperture) in the plastic casing of the game accessory module. Each of the side panels provides these input module apertures, which secure an instructional input device. Fig. 14 of Schoenith, shown below, highlights the input module apertures associated with the input devices of side panel 3:

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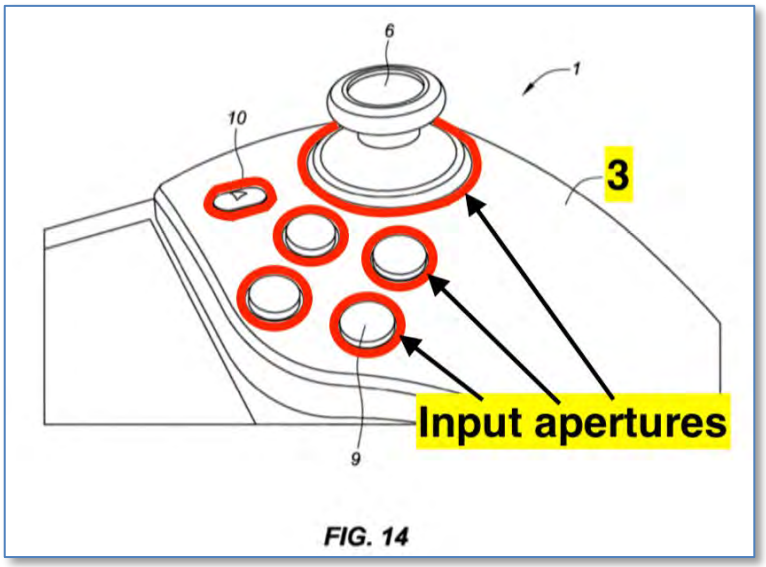


Fig. 14 Schoenith (annotated)

236. Note also that Fig. 9, shown above at ¶[106], illustrates that said input module apertures are adjacent to each of the at least two opposing sides of the plurality of sides of the computing device 30. Additionally, as shown in Fig. 3, the input devices in the form of right and left panels 3 and 4 are separate and distinct structures from the cradle 20, forming no structural portion of the cradle as they are detachable and separate components.

237. Park's controller modules contain the same types of instructional input devices provided via an input aperture. Park ¶¶19, 26-27, 29, Figs. 1.

238. Therefore, Schoenith, in combination with Park, teaches this claim limitation.

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6. Claim element 1(e)(i): "a structural bridge securing the pair of confinement structures one to the other,"

239. Schoenith, in combination with Park, discloses a structural bridge securing the pair of confinement structures one to the other.

240. As discussed above, Schoenith discloses confinement structures in the form of the raised walls of the cradle 20*; see* Schoenith 6:48-50, "Preferably, **the cradle has a raised wall on the right side, left side, front side, back side**, and/or a combination thereof." (emphasis added).

241. Schoenith additionally discloses a structural bridge in the form of the third side of the cradle or, alternatively, back wall of cradle 20. In the combination where there is a right side and left side raised wall, both the third side and/or the back wall of cradle 20 would be, by definition, securing the pair of confinement structures one to the other.

242. To the extent one disagrees that Schoenith teaches a structural bridge, Park provides a more explicit teaching that a POSITA would have been motivated to combine with Schoenith's design. In particular, Park provides a more robust, and adjustable, structural bridge for use in the type of game controller taught by Schoenith (and the '119 patent). Park's bridge would allow a user to adjust to accommodate different sized computing devices, which the market demanded and which provided a benefit to users given the variety of handheld computing devices available to the public. Such a design would work well with Schoenith's controller

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because both are designed to provide two side controllers via a bridge that connects two confining structures, which in turn hold a smartphone or tablet.

243. Therefore, Schoenith, in combination with Park, discloses a structural bridge securing the pair of confinement structures one to the other, rendering this claim term obvious.

7. Claim element 1(e)(ii): "in which each of the pair of control modules provide an attachment structure cooperating with the communication port, each attachment structure secures the input device to the communication port,"

244. Schoenith, in combination with Park, discloses a pair of control modules which provide an attachment structure cooperating with the communication port, each attachment structure securing the input device to the communication port.

245. As explained above, Schoenith discloses controllers in the form of right side panel 3 and left side panel 4, which provide an attachment structure cooperating with the communication port, each attachment structure securing the input device to the communication port*; see* Schoenith 7:16-23, "The **cradle may have one or more connection parts** providing secure connection to the right side panel and/or the left side panel. The **connection can be any connection commonly utilized in controllers**, preferably a connection which allows for **easy and frequent assembly and disassembly of the controller**, such as a magnetic connection, a snap-fit connection, a combination thereof, or the like." (emphasis

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added); 9:31-32 (connection, opening, or both of side panels used to connect to cradle).

246. One skilled in the art would understand the phrase "any connection commonly utilized in controllers" to include connections that are both physical and electronic in nature. See the section of this declaration entitled Background of the Invention for more information on the state of the art at the time of the '119 patent regarding attachment structures used on game controllers.

247. Therefore, Schoenith, in combination with Park, teaches this claim element.

8. Claim element 1(f)(i): "and in which the structural bridge comprising: a conduit between the pair of control modules;"

248. Schoenith, in combination with Park, discloses a structural bridge comprising a conduit between the pair of control modules.

249. While Schoenith discloses a structural bridge in the form of the third side and/or back side of cradle 20, it does not disclose the structural bridge comprising a conduit between the pair of control modules.

250. However, as one of skill in the art would understand, a pair of control modules (input devices) which are used simultaneously to control a game must necessarily be electronically connected for the controllers to operate properly. To that end, an electrical connection (i.e. wire or other connection technology) must

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necessarily ensure that the two control modules are part of the same circuit. If the control modules are physically connected together during operation (as they are in Schoenith), one skilled in the art would understand that a wire would be the simplest and most cost-effective way to make that connection.

251. However, as explained above, high volume, electronic toy products are generally engineered for endurance[30], as they are often handled by young children, who may not appreciate the fragility of electronic components. Therefore, it would have been obvious to one of skill in the art to connect the control modules of Schoenith with a physical wire running through a conduit, to protect the integrity of the wire. Therefore, it would have been obvious to one of skill in the art to run a conduit between the pair of control modules.

252. Moreover, Park's teachings likewise satisfy this claim element in the combination of Schoenith and Park. Park discloses an adjustable-length structural bridge which connects the first body and second body (i.e. the control modules) both mechanically and electrically*; see* Park ¶39, "The bridge (30, 40) whose length can be adjusted and fixed using the above-described method, **mechanically and electrically connects the first body (10) to the second body (20)**…" (emphasis added).

[30] From 1975-1979, I engineered high volume electronic toy products for Parker Brothers, of Beverly, Massachusetts.

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253. Park further discloses that the control modules, in the form of a first body and second body "equipped with key buttons," are "electrically connected by a connecting cable"*; see* Park Claim 1, "A game pad device for a mobile phone, comprising: a bridge that connects the first body and the second body and whose length is adjustable, and which is characterized in that: **the first body and the second body are electrically connected by a connecting cable**…" (emphasis added).

254. Park also discloses that the connecting cable runs inside the bridge*; see* Park ¶36, "**A connecting cable for electrically connecting the first body and second body (10, 20) electrically joins the first body and second body (10, 20)** which are separated from each other and provides the basis for a combined signal to be entered into a mobile phone (1) through a connecting terminal (21). It is connected to the first body (10) and **extends along a certain portion of the inside of the bridge** (30, 40), connecting to the second body (20)." (emphasis added)

255. Park discloses that the length of the bridge that carries the connecting cable is adjustable*; see* Park ¶32, "The bridge (30, 40) is basically in a shape similar to a rectangular parallelepiped having long edges and short edges and is provided to mechanically and electrically connect the first body and the second body (10, 20) **while being adjustable in length**."

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256. One of skill in the art would understand that a wire being run through a mechanically-active environment, such as the inside of a sliding, retracting and expanding bridge, would necessarily be run through a conduit to physically protect the integrity of the wire. Therefore, it would have been obvious to one of skill in the art to run a conduit through the structural bridge of Park to connect the first and second control modules together with a physical wire.

257. Further, it would have been obvious to apply the teachings of Park to Schoenith. The advantages of Park's adjustable bridge would have been obvious to one of skill in the art at the time of the '119 patent. At that point in the market (and before), there were dozens of mobile devices available from manufacturers such as Apple, Google, Samsung, LG and a host of companies marketing mobile devices compatible with Google's Android operating system. There is not, and was not at the time, a standard size for the height of a mobile device.[31] For example, Apple alone (one manufacturer out of dozens in the market), had at least 9 mobile products actively being used by 2012, representing 7 different heights[32] [33] [34]:

Model	**Release date**	**Height**
iPhone 3GS	2009	4.5 in.

[31] The height is the relevant dimension as the devices are used in a landscape mode in the inventions in question.
[32] http://socialcompare.com/en/comparison/apple-ipad-versions-compared-ipad-air-vs-ipad-mini, Appendix O
[33] https://www.cnbc.com/2017/06/29/every-iphone-released-in-order.html, Appendix P
[34] https://www.theiphonewiki.com/wiki/List_of_iPads, Appendix Q

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iPhone 4	2010	4.5 in.
iPhone 4s	2011	4.5 in.
iPhone 5	2012	4.87 in.
iPad 1	2010	9.55 in.
iPad 2	2011	9.49 in.
iPad 3	2012	9.49 in.
iPad mini	2012	7.87 in.
iPad 4 mini	2012	8.00 in.

258. Because of this large variety of sizes, Park's adjustable bridge would have an obvious enhancement to Schoenith's controller accessory. One of skill in the art would have recognized that the feature would greatly expand the number of devices that an inventor's product would support while reducing the need to use multiple cradles, leading to the predictable result of having a larger base of potential customers.

259. Earlier in my declaration[35] in Section VII, I discuss the fact that the products disclosed in Schoenith and Park fall within the same category of products - *associated controller accessories for handheld gaming computing devices*. For this reason, one skilled in the art would have been motivated to apply the teachings of Park to Schoenith as it is an example of improving similar devices in the same way. Also, as discussed in the above Section VII, Schoenith and Park were both addressing the same market need. Therefore, one skilled in the art would have been motivated to attempt a combination of Park and Schoenith because they would be

[35] See Section VII.

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applying a known technique (the adjustable bridge) to a known device (in the same market segment) to yield a predictable result.

260. Therefore, Schoenith, in combination with Park, satisfies this claim element.

9. Claim element 1(f)(ii): "[the structural bridge comprising:] and a fastening mechanism cooperating with the pair of confinement structures, the fastening mechanism secures the pair of confinement structures one to the other."

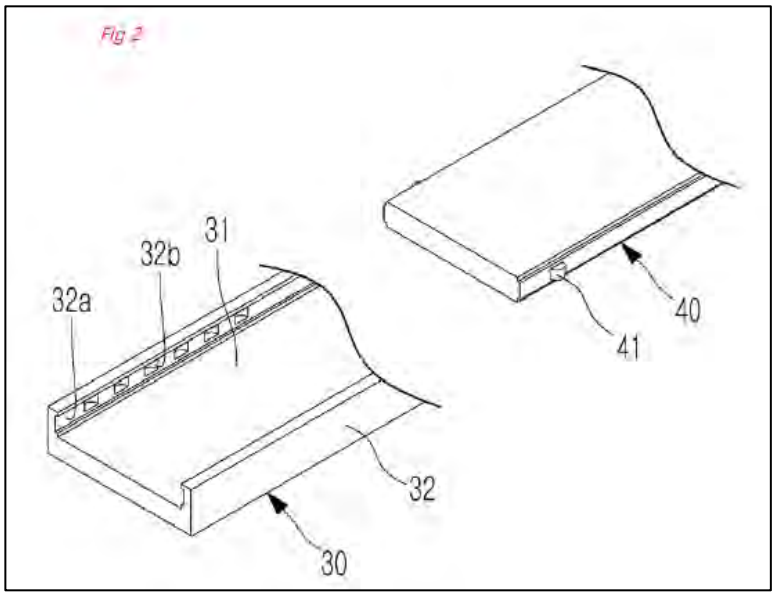
261. Schoenith, in combination with Park, satisfies this claim limitation.

262. While Schoenith discloses a structural bridge in the form of the third side and/or the back side of cradle 20, it does not disclose the structural bridge comprising a fastening mechanism cooperating with the pair of confinement structures, the fastening mechanism secures the pair of confinement structures one to the other.

263. Park, however, discloses an adjustable structural bridge (30, 40) comprising a fastening mechanism in the form of a sliding and locking groove system. First panel 30 is the female side of the fastening mechanism, receiving panel 40. Panel 30 is comprised of recessed guide grooves 32a, with recessed catching holes 32b that are formed on the inside of the guide groove at certain intervals. Panel 40, the male component, is comprised of a matching structure which fits into the guide grooves 32a of panel 30. Panel 40 is also comprised of

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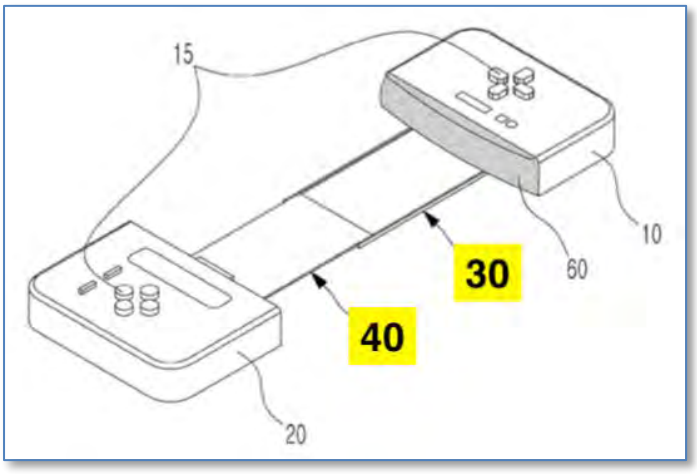
protrusions 41, which are placed at certain intervals along the longitudinal direction. See Fig. 2 below:



Park Fig. 2

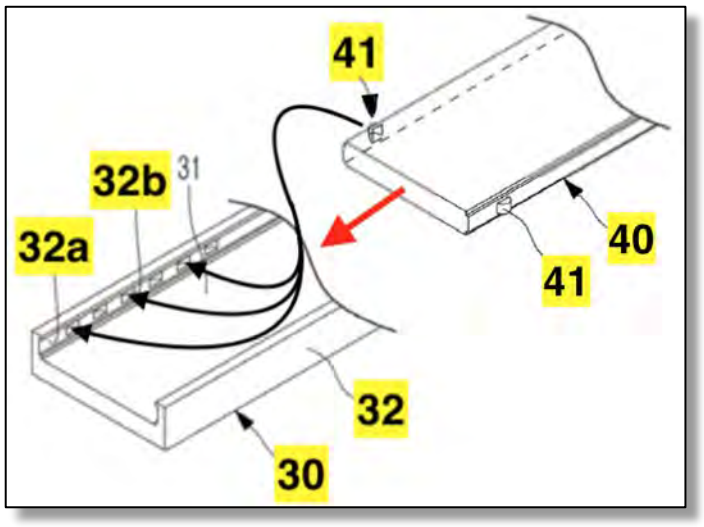
264. In operation, panel 40 is inserted into the guide grooves 32a of panel 30 so that panel 40 can move by sliding, thus adjusting the length of the structural bridge. To mount a mobile phone on the device, the bridge length is extended far enough to allow the phone to be place between the first body and the second body. See image below:

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Park Fig. 4 (annotated)

265. When the phone is in place, panel 40 is moved in by sliding until the desired length is reached (depending on the size of the mobile device) and the protrusions 41 catch the next catching hole 32b. See Fig. 2 (modified[36] and annotated) below:



Park Fig. 2 (modified and annotated)

[36] Fig. 2 as shown is modified to enhance the visibility of the predominantly hidden protrusion 41, which is found on the far wall of the panel 40.

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266. Park thus discloses the fastening mechanism of this claim element in the form of the panels 30 and 40, with their associated catch holes and protrusions. This structure is equivalent to the structure disclosed in the ’119 patent under the proper construction of fastening mechanism. Park's fastening mechanism cooperated with the two confinement structures and secured them one to the other because it secured the panels, and thus, would secure the two separate raised walls of Schoenith together. In my opinion, it would have been obvious to one of skill in the art to combine the adjustable bridge of Park (including its fastening mechanism) with Schoenith.

267. The advantages of Park’s adjustable bridge would have been obvious to one of skill in the art at the time of the ‘119 patent. As already explained, at that point in the market, there were dozens of mobile devices available from manufacturers such as Apple, Google, Samsung, LG and a host of companies marketing mobile devices compatible with Google’s Android operating system. There is not, and was not at the time, a standard size for the height of a mobile device.[37] For example, Apple alone (one manufacturer out of dozens in the

[37] The height is the relevant dimension as the devices are used in a landscape mode in the inventions in question.

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market), had at least 9 mobile products actively being used in 2012, representing 7 different heights[38] [39] [40]:

Model	Release date	Height
iPhone 3GS	2009	4.5 in.
iPhone 4	2010	4.5 in.
iPhone 4s	2011	4.5 in.
iPhone 5	2012	4.87 in.
iPad 1	2010	9.55 in.
iPad 2	2011	9.49 in.
iPad 3	2012	9.49 in.
iPad mini	2012	7.87 in.
iPad 4 mini	2012	8.00 in.

268. Because of this large variety of sizes, Park's adjustable bridge would have an obvious enhancement to Schoenith's controller accessory. One of skill in the art would have recognized that the feature would greatly expand the number of devices that an inventor's product would support, leading to the predictable result of having a larger base of potential customers.

269. Earlier in my declaration[41] in Section VII, I discuss the fact that the products disclosed in Schoenith and Park fall within the same category of products - *associated controller accessories for handheld gaming computing devices*. For

[38] http://socialcompare.com/en/comparison/apple-ipad-versions-compared-ipad-air-vs-ipad-mini, Appendix O
[39] https://www.cnbc.com/2017/06/29/every-iphone-released-in-order.html, Appendix P
[40] https://www.theiphonewiki.com/wiki/List_of_iPads, Appendix Q
[41] See Section VII above.

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this reason, one skilled in the art would have been motivated to apply the teachings of Park to Schoenith as it is an example of improving similar devices in the same way. Also, as discussed in the above Section VII, Schoenith and Park were both addressing the same market need. Therefore, one skilled in the art would have been motivated to attempt a combination of Park and Schoenith because they would be applying a known technique (the adjustable bridge) to a known device (in the same market segment) to yield a predictable result.

270. Therefore, Schoenith, in combination with Park, satisfies this claim element. As a whole, the combination of Schoenith and Park renders claim 1 obvious.

10. Dependent Claim 3: "The combination of claim 1, further comprising an auxiliary power source confined within the input device and communicating with the computing device."

271. Schoenith, in combination with Park, renders this claim obvious. As discussed above in my claim 1 analysis, Schoenith discloses input devices in the form of the left and right side panels 3 and 4. Schoenith also discloses a computing device in the form of the smart device 30.

272. Schoenith further discloses power storage/batteries to power its operation, and that the docking port enabled charging of the smart device while it was in the controller; see Schoenith 7:49-67. Park likewise taught a docking port for connecting to the mobile phone. Park ¶¶26, 28 (connecting terminal 21), Fig.

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1. One having skill in the art would have known that utilizing a power source in the controller that could communicate with the computing device is nothing more than utilizing known elements (e.g., batteries) as intended (to provide power) with predictable results (the computing device receives power).

273. In light of these teachings, Schoenith, in combination with Park, renders this claim obvious.

11. Dependent Claim 4: "The combination of claim 1, in which the instructional input device is a removable input device, and in which the removable input device passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

274. Schoenith, in combination with Park, renders this claim obvious.

275. As explained above, Schoenith teaches that the instructional input devices, or buttons, joysticks, etc., "may be backlit, removable or non-removable, and interchangeable." Schoenith 5:55-56. Schoenith also taught that its controls were used to control a game application on the hand-held device (1:21-62) and that it had connections "for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof." Id. at 7:35-41 (emphasis added). It likewise taught that wired connections, such as a docking connector, were provided between the smart device and the controller in the panels, the cradle, or a combination thereof.

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Schoenith 7:42-47. Thus, the controls could pass signals from the removable input devices through the communication port (or cradle) and then to the smart device.

276. Park similarly discloses a computing device in the form of mobile phone 10. Park discloses an input device in the form of the first body and second body (10, 20) with instructional input devices in the form of buttons, d-pads, etc.*; see* Park ¶26, "…the game pad device for a mobile phone according to the present invention comprises by default : **a first body (10) on one side** of which (preferably the upper face) **are provided key buttons (15)**; **a second body (20)** that is distanced from the first body (10) **having key buttons (15)** on one side." (emphasis added).

277. Park further discloses that the input device passes signals through the communication port to the computing device 10*; see* Park ¶36, "**A connecting cable for electrically connecting the first body and second body** (10, 20) electrically joins the first body and second body (10, 20) which are separated from each other and **provides the basis for a combined signal to be entered into a mobile phone (1) through a connecting terminal (21)**."

278. Park discloses a system which generates control signals when buttons are pressed and sends those signals to a mobile phone device in order to affect the operation of the device*; see* Park ¶28, "The connecting terminal (21) is connected to an interface connector on the mobile phone (10) for connection with outside

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devices, and **inputs signals entered from the key buttons (15) according to the present invention to the mobile phone (10)**"*; see* also Park ¶30, " … in the first body and the second body (10, 20), **when a user presses a key button (15) provided on the upper face and generates the signal**, **the generated signal is entered into the game software running on the mobile phone** (1) through the connecting terminal (21) provided on the second body (20) to **carry out the basic function of the game pad device for a mobile phone** according to the present invention." (emphasis added).

279. In my opinion, it would be obvious to one of ordinary skill in the art that Park's description of an electronic device "carry[ing] out the basic function of the game pad device for a mobile phone" which sends key press signals which are "entered into the game software running on the mobile phone" is, in fact, disclosing an instructional input device which passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device.

280. In light of these teachings, Schoenith, in combination with Park, renders this claim obvious.

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12. Dependent Claim 5: "The combination of claim 1, in which the instructional input device is a game control module, and in which the game control module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

281. Schoenith, in combination with Park, renders this claim obvious. As discussed in my analysis for claim 4, both Schoenith and Park disclose an instructional input device which passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device. One of ordinary skill in the art would have recognized the left and right handle housings or controller panels in each contain input controls that are game control modules—they are input buttons, d-pads, and joysticks (among others) that are specifically provided for controlling gaming applications. Consequently, both Schoenith and Park disclose an instructional input device that satisfies this claim. Schoenith, in combination with Park, renders this claim obvious.

13. Dependent Claim 6: "The combination of claim 1, in which the instructional input device is a keyboard module, and in which the keyboard module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

282. Schoenith, in combination with Park, renders this claim obvious. As discussed above in my claim 1 analysis, Schoenith discloses input devices in the

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form of the left and right side panels 3 and 4. Schoenith also discloses a computing device in the form of the smart device 30. As discussed above in my analysis of dependent claim 5, Schoenith and Park each disclose an instructional input device which passes signals through the communication port to the computing device, with those signals controlling images displayed on the display screen of the computing device.

283. While Schoenith does not explicitly disclose a keyboard module as an input device, one of skill in the art would have understood that Schoenith's disclosure was not limited to the specific input devices described in the specification*; see* Schoenith 11:30-38, "Although the controller described herein includes illustrations relating to its use with an e-reader/tablet style device such as the iPhone®, iPad®, and iPad Mini (available from Apple, Inc., Cupertino, Calif.), it is understood that **the controller can be formed in alternative sizes, shapes and configurations to serve as a controller having the described features and utilities for other electronic devices** such as smart phones, MP3 players, **computing devices**, and other popular electronic devices." In fact, the disclosure "**computing devices**" can be interpreted to cover a keyboard module, which is the primary control of a computing device. (emphasis added).

284. Schoenith further confirms the embodiments as described "are not restrictive," and that "[m]any embodiments as well as many applications besides

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the examples provided will be apparent to those of skill in the art upon reading the above description," *see* Schoenith 12:16-19.

285. Park likewise teaches that a variety of instructional input devices or controls could be used. Park ¶¶19, 29, "[I]t goes without saying that they key buttons (15) are not limited to a particular shape and function.".

286. In my opinion, based on the above and a POSITA's knowledge, it would have been obvious to one of ordinary skill in the art to include a keyboard module as an instructional input device in the combination of Schoenith with Park. A keyboard module is nothing more than a known user input means that has a combination of buttons or controls. Its use in the claimed context was known and would produce predictable results. Therefore, Schoenith, in combination with Park, renders this claim obvious.

14. Dependent Claim 7: "The combination of claim 4, in which the removable instructional input device is a removable game control module."

287. The combination of Schoenith with Park renders this claim obvious for the same reasons as claims 4 and 5. As explained above, Schoenith teaches that its buttons, joysticks, or input controls, which are instructional input devices, or game control modules, "may be backlit, removable or non-removable, and interchangeable." Schoenith 5:55-56. A POSITA would have understood that

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Schoenith's and Park's input controls (buttons, d-pads, joysticks) are game control modules that, as taught in Schoenith, can be removable and interchangeable.

15. Dependent Claim 8: "The combination of claim 4, in which the removable instructional input device is a removable keyboard module."

288. Claim 8 would have been obvious for the same reasons explained for claims 4 and 6. As explained above, Schoenith taught removable and/or interchangeable instructional input devices. Schoenith 5:55-56. Use of a keyboard module—a different type of known input means for its intended purpose, to provide user input—would have been obvious to a POSITA in light of Schoenith's and Park's teachings that a variety of input controls could be used.

16. Dependent Claim 9: "The combination of claim 1, in which the structural bridge is a ridged structure."

289. Schoenith, in combination with Park, discloses a structural bridge which is a ridged structure.

290. As discussed above, Schoenith discloses a structural bridge in the form of the third side of or the back wall of cradle 20. Schoenith further discloses that the cradle is a rigid structure*; see* Schoenith 8:43-47, "A secure accommodation of a smart device in a **detachable or undetachable cradle may require materials offering requisite rigidity** such as polymeric materials including but not limited to thermoplastics, thermoset plastics, elastomeric materials or any combination thereof." (emphasis added). Park taught that its

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bridge comprised two sliding portions connected via a series of recessed catching holes and protrusions. Park ¶¶9, 14, 33. A POSITA would have understood such a teaching to require that the bridge be a rigid structure in order to properly function.

291. Therefore, Schoenith, in combination with Park, renders this claim obvious.

17. Dependent Claim 10: "The combination of claim 9, in which the rigid structural bridge is a removable rigid structure."

292. Schoenith, in combination with Park, discloses the rigid structural bridge as a removable rigid structure.

293. As discussed above, Schoenith discloses a ridged structural bridge. Schoenith further discloses that the structural bridge is a removable rigid structure*;* *see* Schoenith, 7:14-16, "The cradle may be attached to the right side panel on the right side and the left side panel on the left side. **The cradle may be detachable**." In light of this teaching, it would be obvious that the bridge in the combination of Schoenith with Park would be a removable rigid structure.

294. Therefore, Schoenith, in combination with Park, renders this claim obvious.

18. Dependent Claim 13: "The combination of claim 1, in which the communication link is a signal pathway."

295. Schoenith, in combination with Park, discloses a communication link which is a signal pathway.

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296. As explained above, Schoenith discloses a device which provides a communication link*; see* Schoenith 7:35-40, "For example, the controller may include at least one **wireless connection, such as Bluetooth® or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof**..." (emphasis added). Schoenith also discloses wired communication links*; see* Schoenith 7:42-48, "The controller may include at least one power connector to provide a **wired connection between the smart device and the controller in the right side panel, left side panel, the cradle, or a combination thereof**. The at least one power connector may be any connector typically utilized to connect a smart device to a host device, such as a 30-pin dock connector or **Apple Lightning® connector**." (emphasis added)*; see also id*. 8:16-20, "The controller may include at least one microphone jack in the right side panel, left side panel, the chassis, the cradle, or a combination thereof. The one or more microphone jacks may be located on any side of the right side panel, left side panel, the chassis, or the cradle."

297. One of ordinary skill in the art would understand the wireless communication link to be a signal pathway, as it carries "data" between the smart device and the various elements of the controller system. One of ordinary skill in the art would also understand the first wired communication link to be a signal

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pathway, as the circuit is disclosed to include the Apple Lightning connector, the primary hard-wired data communications port for Apple mobile devices.

298. Similarly, Park's structural bridge teaches a communication link in the form of a connection cable running inside the bridge that connected the two side controllers. Park ¶36. This too is a signal pathway.

299. In light of these teachings, Schoenith, in combination with Park, renders this claim obvious.

19. Dependent Claim 14: "The combination of claim 13, in which the signal pathway is a metallic pathway."

300. Schoenith, in combination with Park, discloses a signal pathway which is a metallic pathway.

301. In the previous claim analysis, I discuss Schoenith's disclosure of a wired communication link which is a signal pathway. One skilled in the art would understand that a wire is a metallic conductor. Further, a POSITA would know that the use of a metallic pathway, or wire, is a known design option that would be used as expected (to provide a pathway for signals) to produce entirely predictable results (transmission of signals).

302. Therefore, Schoenith, in combination with Park, renders this claim obvious.

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20. Dependent Claim 15: "The combination of claim 13, in which the signal pathway is a fiber optic pathway."

303. Schoenith, in combination with Park, discloses a signal pathway which is a fiber optic pathway.

304. As discussed above, Schoenith discloses both wired and wireless signal pathways, using technologies and communications protocols "such as" Apple Lightning, audio transmission, Bluetooth® or infrared light-emitting diodes (LEDs)*; see* Schoenith 7:42-48, 7:35-40, 8:16-20. Schoenith also discloses potential applications for the device, including "voice and video communication" and "digital media extenders" (*see* Schoenith 4:32-39), applications which would be greatly enhanced by the use of a fiber optic pathway.

305. In my opinion, it would have been obvious to one of ordinary skill in the art to consider signal transmission via fiber optic as another option in Schoenith's open-ended disclosure of communication standards and protocols. The mention of video, voice and digital media data would motivate one of ordinary skill in the art to consider fiber optic as an alternate approach to signal transmission. Consequently, in my opinion, Schoenith discloses a signal pathway which is a fiber optic pathway.

306. Therefore, Schoenith, in combination with Park, renders this claim element obvious. The Schoenith/Park combination would take the form, for example, of a fiber optic cable running through an adjustable bridge.

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21. Dependent Claim 16: "The combination of claim 1, in which the communication link provides a communication platform."

307. Schoenith, in combination with Park, discloses a communication link which provides a communication platform.

308. As discussed above, Schoenith discloses both wired and wireless communication links*; see* Schoenith 7:42-48, "The controller may include at least one power connector to provide a **wired connection between the smart device and the controller in the right side panel, left side panel, the cradle, or a combination thereof**. The at least one power connector may be any connector typically utilized to connect a smart device to a host device, such as a 30-pin dock connector or **Apple Lightning® connector**." *also see id*. 7:35-40, "For example, the controller may include at least one **wireless connection, such as Bluetooth® or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof**..." (emphasis added). Park similarly taught a connection cable running inside the bridge that connected the two side controllers. Park ¶36.

309. In light of these disclosures, a POSITA would have found it obvious for the communication link to provide a communication platform.

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22. Dependent Claim 17: "The combination of claim 16, in which the communication platform is a wired communication module."

310. Schoenith, in combination with Park, discloses a communication platform which is a wired communication platform.

311. As discussed above in claim 16, Schoenith discloses a wired communication platform*; see* Schoenith 7:42-48, "The controller may include at least one power connector to provide a **wired connection between the smart device and the controller in the right side panel, left side panel, the cradle, or a combination thereof**. The at least one power connector may be any connector typically utilized to connect a smart device to a host device, such as a 30-pin dock connector or **Apple Lightning® connector**." Park similarly taught a connection cable running inside the bridge that connected the two side controllers. Park ¶36.

312. Therefore, Schoenith, in combination with Park, renders this claim element obvious.

23. Dependent Claim 18: "The combination of claim 16, in which the communication platform is a wireless communication platform."

313. Schoenith, in combination with Park, discloses a communication platform which is a wireless communication platform.

314. As discussed above in claim 16, Schoenith discloses a wireless communication platform*; see* Schoenith 7:35-40, "For example, the controller may

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include at least one **wireless connection, such as Bluetooth® or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof**...” (emphasis added).

315. Therefore, Schoenith, in combination with Park, renders this claim element obvious. The Schoenith/Park combination would take the form of, for example, the wireless component, as taught in Schoenith, implemented in an adjustable bridge, as taught by Park, so that the detachable controllers of Schoenith would be in wireless communication with components comprising the adjustable bridge, which in turn would interact with the computing device and communicate with the detachable controllers.

24. Dependent Claim 19: “The combination of claim 18, in which the wireless communication platform operates in a frequency range of 2.4 GHz.”

316. Schoenith, in combination with Park, discloses a communication platform which is a wireless communication platform which operates in a frequency range of 2.4 GHz.

317. As discussed above in claim 16, Schoenith discloses a wireless communication platform*; see* Schoenith 7:35-40, “For example, the controller may include at least one **wireless connection, such as Bluetooth® or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the**

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controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof...” (emphasis added).

318. As one of ordinary skill in the art would know, the Bluetooth wireless technology broadcasts in the 2.4 GHz range*; see* Wired.com[42], “**You live your life at 2.4 GHz**. **Your router**, your cordless phone, **your Bluetooth earpiece**, your baby monitor and your garage opener all love and live on this radio frequency, and no others.” (emphasis added)

319. Therefore, Schoenith, in combination with Park, renders this claim element obvious.

25. Dependent Claim 20: “The combination of claim 17, in which the wireless communication platform is a personal area network.”

320. Schoenith, in combination with Park, discloses a wireless communication platform which is a personal area network.

321. As discussed above in claim 16, Schoenith discloses a wireless communication platform*; see* Schoenith 7:35-40, “For example, the controller may include at least one **wireless connection, such as Bluetooth® or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof**...” (emphasis added).

[42] https://www.wired.com/2010/09/wireless-explainer/

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322. A *personal area network*, or PAN, is a computer network organized around an individual person, which is set up for personal use only.[43] Personal area networks are generally used to transmit data between nearby devices (i.e. peer-to-peer[44]), such as computers, phones, printers, game systems, game controllers and tablets. Personal area networks are often deployed with Bluetooth, though they can also be connected through a wireless (wifi) network.

323. In light of Schoenith's disclosures, a POSITA would have understood that the communication platform would include a personal area network. The Schoenith/Park combination would take the form of, for example, the wireless component, as taught in Schoenith, implemented in an adjustable bridge, as taught by Park, so that the detachable controllers of Schoenith would be in wireless communication with components comprising the adjustable bridge, which in turn would interact with the computing device and communicate with the detachable controllers. Therefore, Schoenith, in combination with Park, renders this claim element obvious.

[43] https://www.lifewire.com/definition-of-pan-817889, Appendix S
[44] peer-to-peer – "denoting or relating to computer networks in which each computer can act as a server for the others, allowing shared access to files and peripherals without the need for a central server." Google Dictionary, Appendix T

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26. Dependent Claim 21: "The combination of claim 17, in which the wireless communication platform utilizes infrared technology for data transactions."

324. Schoenith, in combination with Park, discloses a wireless communication platform which utilizes infrared technology for data transactions.

325. As discussed above in claim 16, Schoenith discloses a wireless communication platform*; see* Schoenith 7:35-40, "For example, the controller may include at least one **wireless connection,** such as Bluetooth® **or infrared light-emitting diodes (LEDs) for exchanging data between the smart device and the controller in the right side panel, left side panel, the chassis, the cradle, or a combination thereof**..." (emphasis added).

326. Therefore, Schoenith, in combination with Park, renders this claim element obvious.

27. Summary

327. In summary, based on the above analysis, it is my opinion that Schoenith, in combination with Park, renders obvious each and every element of the claims 1, 3-10, and 13-21 of the '119 patent.

C. Obviousness Based on Michael in View of Park

328. The following sections provide an analysis that demonstrates how the combination of Michael with Park renders claims 1-10 and 13-21 obvious. As noted above, a POSITA would have had several reasons to combine the teachings

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of Michael and Park. As an initial matter, both references disclose controllers designed to hold a smart phone or tablet in place and provide external control modules for use in gaming. The control modules, like all game controllers, provide buttons, joysticks, or other input devices for use in gaming and resemble well-known game controllers. These controllers were designed to solve problems associated with gaming on smart devices and satisfied market demand for products that enable a more enjoyable gaming experience on mobile devices by providing well-known gaming control layouts that are customizable to a user. Thus, a POSITA would have been knowledgeable about the teachings of each reference—including that the teachings of one would be applicable to the other given that they taught extremely similar devices.

1. Claim element 1(a): "A combination comprising:

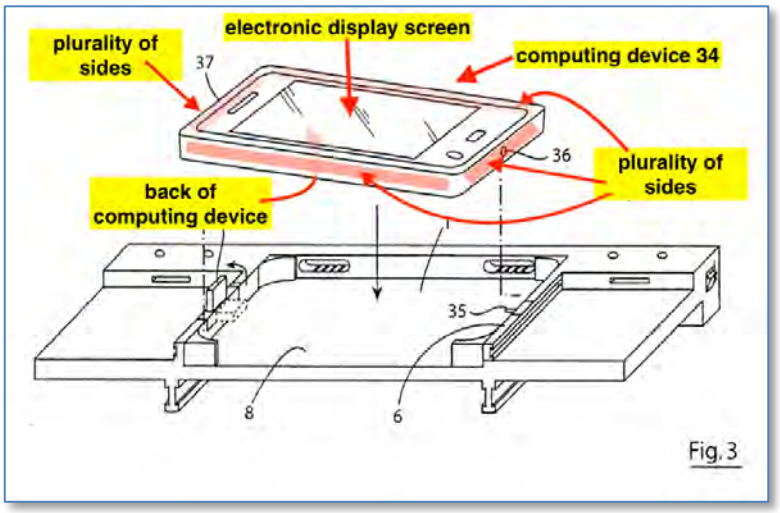
329. Michael, in combination with Park, is a combination of claimed elements, as described below.

2. Claim element 1(b): "a computing device, the computing device providing a plurality of sides, each of the plurality of sides are disposed between an electronic display screen of the computing device and a back of the computing device;"

330. Michael, in combination with Park, discloses a computing device, the computing device providing a plurality of sides, each of the plurality of sides are disposed between an electronic display screen of the computing device and a back of the computing device.

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331. Michael discloses a computing device providing a plurality of sides in the form of a personal electronic device 34, with each of the plurality of sides disposed between an electronic display screen of the computing device and a back of the computing device*; see* Michael ¶139 and Fig. 3, below:



Michael Fig. 3 (annotated)

332. Therefore, Michael satisfies this claim limitation. Park, as noted above, also teaches a portable computing device that satisfies this limitation.

3. Claim element 1(c): "a communication port interacting with the computing device, the communication port providing a communication link and a pair of confinement structures, the pair of confinement structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device;"

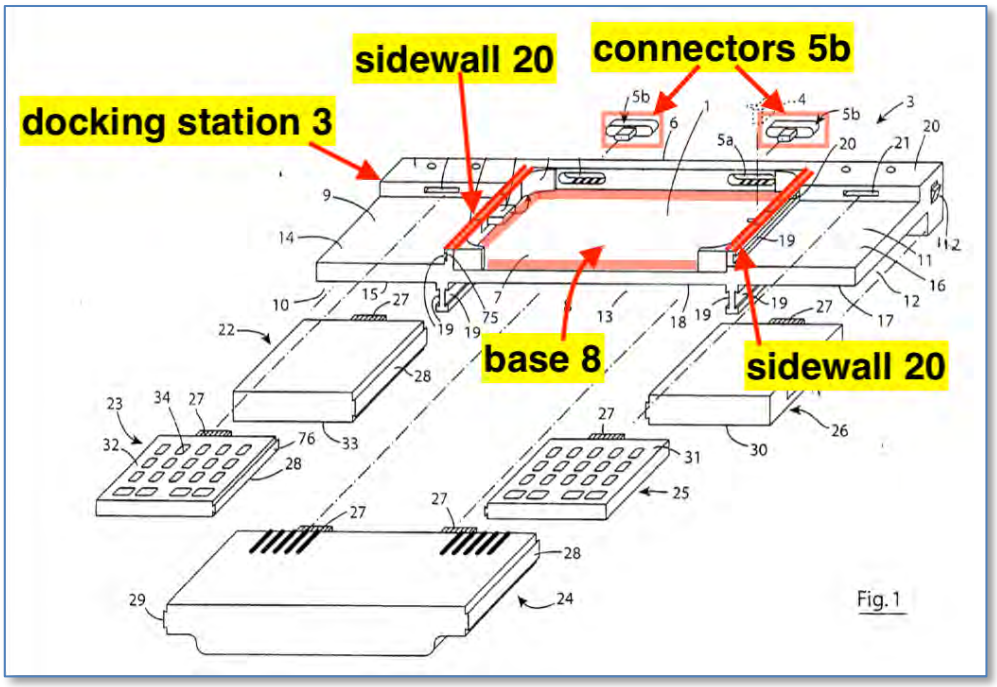
333. Michael, in combination with Park, satisfies this claim limitation.

334. Michael discloses docking station 3, which interacts with the personal electronic device; *see* Michael ¶125, "FIG. 1 shows a **docking station 3** for a

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personal electronic device such as a mobile phone. The **docking station provides a first compartment 1 into which the personal electronic device may be fitted**."

335. The docking station 3 further provides a pair of confinement structures adjacent to and confining the computing device on at least two opposing sides in the form of the sidewalls 20 and grips that hold the phone in place; *see id.* ¶125, "The first compartment 1 is defined by a docking support in the form of a **frame or rim 6 having sidewalls** of suitable material…"; *also id.* at ¶127, "Sidewalls 20 define the edges of each compartment." (emphasis added). See Fig. 1 below:



Michael Fig. 1 (annotated)

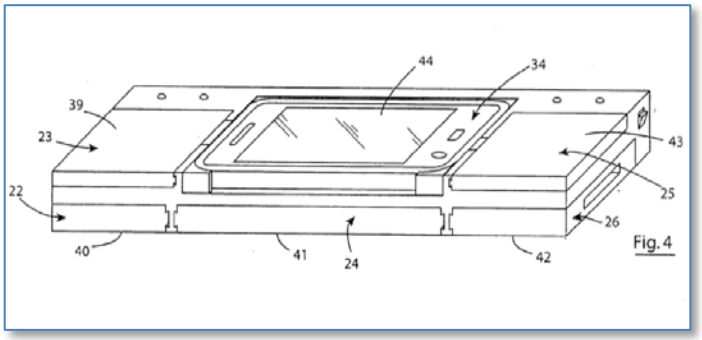
336. The docking station provides a communication link in the form of connective arrangement 21, which was a "port for receiving a plug on the modular

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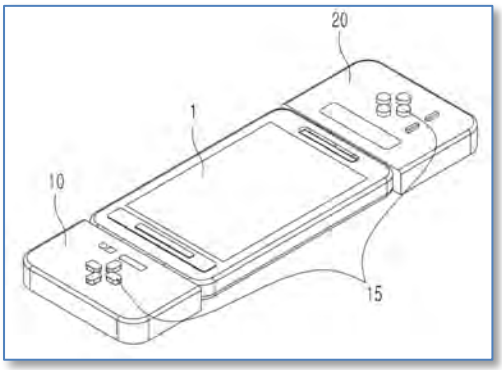
device, *see id.*¶128-30, 134, Fig. 1. It also teaches a similar embodiment in which the communication link is connective arrangement 1404, which is a port for receiving the plugs on the modular controllers; it could also be a "terminal, jack or wiring." *Id.*¶¶175-78, Fig. 14. Michael also disclosed connectors 5b, which "engage a terminal of the personal device when docked" and allowed communications between the device and the phone, *see id*. ¶126. Thus, Michael teaches a communication link that allows communication between the detachable control modules, through the communication port (docking device) to the phone. To the extent one suggests that Michael's disclosures are insufficient, I note that Park disclosed a similar game controller where the two controller modules are explicitly connected via an electrical cable running through the bridge. Park ¶36. In my opinion, a POSITA seeking an even more detailed disclosure of what Michael taught would have looked to Park, which showed how one would connect the modules via the communication port providing a communication link.

337. Michael discloses that its control modules are located adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device, as Park does. See the images below of Michael's device, on the left, and Park's device, on the right, both with the computing device docked in the control unit:

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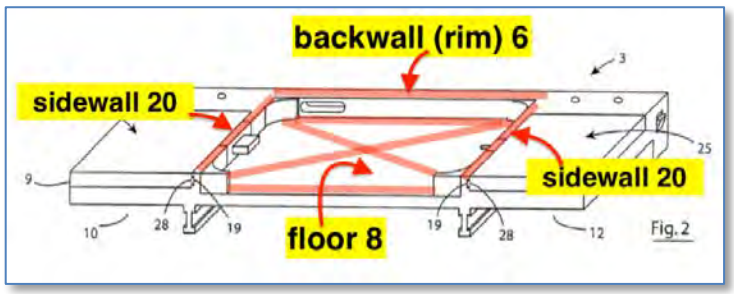


Michael Fig. 4, holding computing device

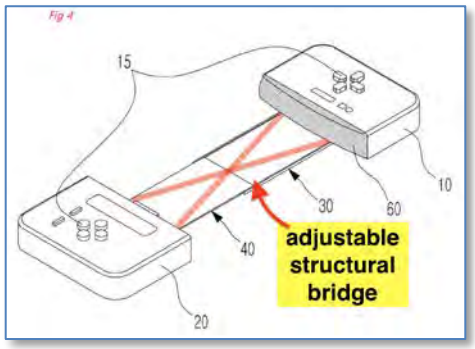


Park Fig. 3, holding computing device

338. The devices are also similar in design without the computing device in place, as shown below, with the exception of the type of structure used to connect the two opposing sides that are adjacent to and confining the computing device:



Michael Fig. 2, no computing device



Park Fig. 4, without computing device

339. Park discloses a structural bridge with a fastening mechanism, which, when combined with Michael's confinement structures, would satisfy the required claim elements (addressed in more detail below). Michael's invention, shown on the left above, confines the computing device with the sidewalls 20, which are held a *fixed distance* apart by the backwall 6, and the floor 8, limiting the usefulness of the invention to computing devices of a specific width. Park, however, confines the computing device in an area of *variable size*, determined by the setting of the

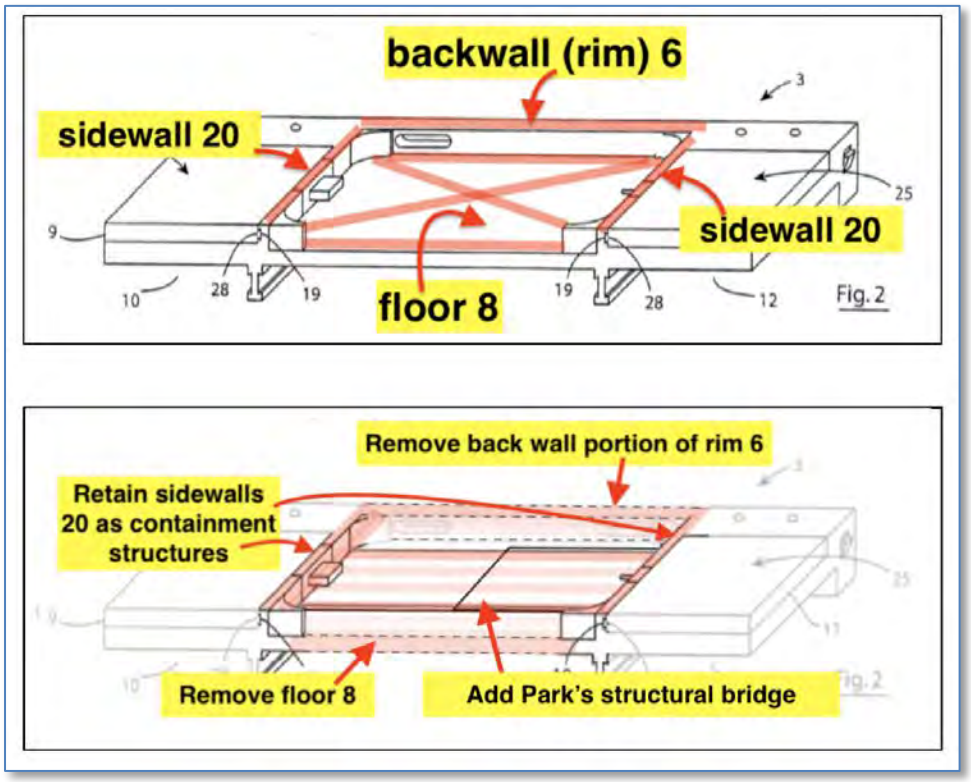
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adjustable structural bridge, made up of components 30 and 40, which comprise the fastening mechanism required by claim element 1(f)(ii). The ability to adjust the width of the docking compartment, enabled by the required fastening mechanism, opens up Park's invention to a larger base of compatible computing devices while explicitly teaching how to include a communication link.

340. In my opinion, given the similarity of the two devices, it would have been obvious to one of ordinary skill in the art to combine the teachings of Michael with Park's disclosure to arrive at a device with greater commercial potential; i.e. one with an adjustable compartment width, enabled by Park's adjustable bridge and the associated fastening mechanism.

341. From an engineering standpoint, a POSITA would have recognized that removing the fixed bridge of Michael (made up of the backwall 6 and floor 8) and replacing it with the adjustable structural bridge of Park, while maintaining Michael's sidewalls 20 as the containment structures, would lead to an improved game control device. Given the technical similarity of the devices, this modification would have been low risk, yielding the predictable result of adding an adjustable width docking compartment. See the illustrations below, the top showing the current Michael disclosure and the bottom showing one possible way to combine Michael and Park:

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Possible modification of Michael to incorporate teachings of Park

342. In implementing these modifications, one would have known to include confinement structures as taught by Michael in the form of the sidewalls 20, located in the same place as the controllers in each reference (adjacent to and confining the computing device on at least two sides). Together with the communication link, which Michael and Park teach as being located in the structural bridge, the confinement structures would form the recited device.

343. The advantages of Park's adjustable bridge would have been obvious to one of skill in the art at the time of the '119 patent. As already explained, at that point in the market, there were dozens of mobile devices available from manufacturers such as Apple, Google, Samsung, LG and a host of companies

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marketing mobile devices compatible with Google's Android operating system. There is not, and was not at the time, a standard size for the height of a mobile device.[45] For example, Apple alone (one manufacturer out of dozens in the market), had at least 9 mobile products actively being used in 2012, representing 7 different heights[46] [47] [48]:

Model	**Release date**	**Height**
iPhone 3GS	2009	4.5 in.
iPhone 4	2010	4.5 in.
iPhone 4s	2011	4.5 in.
iPhone 5	2012	4.87 in.
iPad 1	2010	9.55 in.
iPad 2	2011	9.49 in.
iPad 3	2012	9.49 in.
iPad mini	2012	7.87 in.
iPad 4 mini	2012	8.00 in.

344. Because of this large variety of sizes, Park's adjustable bridge would have been an obvious enhancement to Michael's controller accessory. One of skill in the art would have recognized that the feature would greatly expand the number

[45] The height is the relevant dimension as the devices are used in a landscape mode in the inventions in question.
[46] http://socialcompare.com/en/comparison/apple-ipad-versions-compared-ipad-air-vs-ipad-mini, Appendix O
[47] https://www.cnbc.com/2017/06/29/every-iphone-released-in-order.html, Appendix P
[48] https://www.theiphonewiki.com/wiki/List_of_iPads, Appendix Q

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of devices that an inventor's product would support, leading to the predictable result of having a larger base of potential customers.

345. Earlier in my declaration[49] in Section VII, I discuss the fact that the products disclosed in Michael and Park fall within the same category of products - *associated controller accessories for handheld gaming computing devices*. For this reason, one skilled in the art would have been motivated to apply the teachings of Park to Michael as it is an example of improving similar devices in the same way. Also, as discussed in the above Section VII, Michael and Park were both addressing the same market need. Therefore, one skilled in the art would have been motivated to attempt a combination of Park and Michael because they would be applying a known technique (the adjustable bridge) to a known device (in the same market segment) to yield a predictable result.

346. Section VII discusses a number of other reasons why one of ordinary skill in the art would have been motivated to consider a combination of the teachings of Michael with Park.

347. Therefore, Michael, in combination with Park, satisfies this claim element.

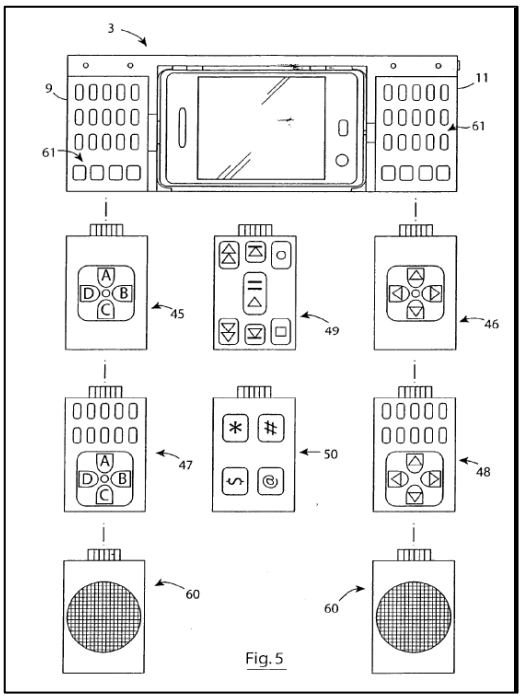
[49] See Section VII.

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4. Claim element 1(d)(i): "an input device attached to and in electronic communication with the communication port;"

348. Michael, in combination with Park, satisfies this limitation.

349. Michael discloses input devices in the form of the interchangeable modular accessories that could include gaming controls, buttons, and keypads/keyboards; *see* Michael ¶17, "The interchangeable modular accessories will generally be input or output devices"; see *also id*. ¶131, "Modular devices such as speakers 60 and keypad comprising text buttons 61 are further possibilities[,]" also identifying "gaming control pads 45 and 46" (emphasis added), and Fig. 5, below:



Michael Fig. 5

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350. Michael discloses that the input devices are attached to and in electronic communication with the docking station*; see* Michael ¶43, "It is desirable that any **connective arrangements such as ports, jacks, terminals, wiring** or the like are accommodated internally in the assembly so that they are hidden from view in the assembly. **This may be achieved by having any connective arrangements on a sidewall of the compartment**. **Any connective arrangements on the accessory can also be on a sidewall of the accessory**." Accordingly, when the accessory is fitted into the compartment, the connective arrangements will be arranged to mate and will be hidden for view." (emphasis added). Additionally, as noted above, the docking station identifies connective arrangements 21 and 1404 as ways the control modules electrically connect to the docking station. *see id.* ¶128-30, 134, 175-78, Fig. 1, 14. The input devices are a separate and distinct structure from the communication port because they are physically and electronically detachable modular components. *Id.* ¶¶18-31, 41, 45, 82;

351. Park also teaches the claimed input device in the form of a pair of control modules that contain input devices (buttons, d-pad). Park ¶¶19, 26-27, 29, Figs. 1. Signals from those input devices were communicated via the electrical connection in the bridge and the docking port in the side body—thus, via the communication port.

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352. As I discuss above in reference to claim element 1(c), it would have been obvious for one of skill in the art to incorporate the adjustable structural bridge of Park, including its fastening mechanism, into Michael's control apparatus. In addition to the analysis regarding claim element 1(c), in Section VII above, "MOTIVATION TO COMBINE," I discuss a number of reasons why one of ordinary skill in the art would have been motivated to consider a combination of the teachings of Michael with Park.

353. In light of these disclosures, Michael, in combination with Park, satisfies this claim element.

5. Claim element 1(d)(ii): "the input device providing a pair of control modules, the pair of control modules providing input module apertures, each input module aperture secures an instructional input device, wherein said input module apertures are adjacent each of the at least two opposing sides of the plurality of sides of the computing device, and wherein the input device is a separate and distinct structure from the communication port, forming no structural portion of the communication port; and"

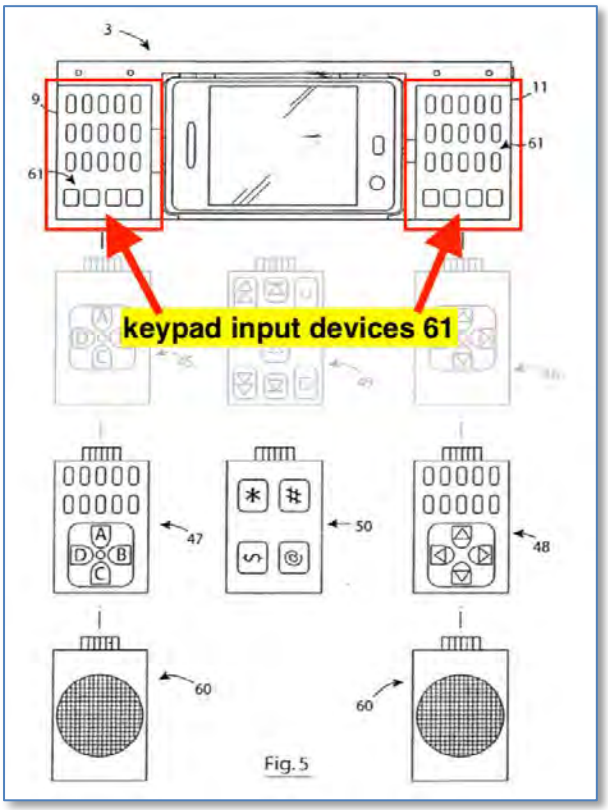
354. Michael, in combination with Park, satisfies this claim limitation.

355. Michael discloses control modules providing input module apertures with instructional input devices; for example, *see* Michael ¶¶18-19, "Some examples of the types of modular devices contemplated for use within the present invention include… controllers including **control pads**, touch pads, **key pads**, **key boards**, **roller balls**, **joysticks**, mouse devices, motion sensors, and other

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controllers such as **game controllers** and the like"; see also *id*. ¶131, "Modular devices such as speakers 60 and **keypad comprising text buttons 61 are further possibilities**" (emphasis added).

356. Michael Fig. 5, shown below, discloses control modules, in the form of modular input devices, providing input module apertures which secure an instructional input device in the form of the keys of keypads 61 or d-pads, sitting adjacent each of the at least two opposing sides of the plurality of sides of the computing device:

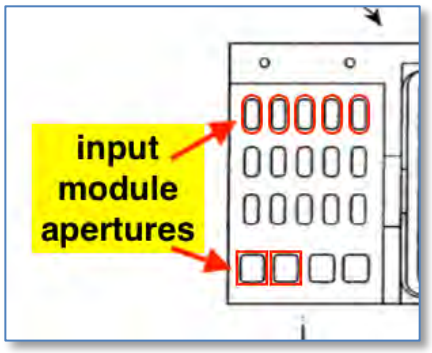


Michael Fig. 5 (annotated)

357. As one of skill in the art would understand, these types of input devices (buttons, joysticks, keys, etc.) feed through an opening (i.e. aperture) in the

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plastic casing of the modular device, securing the instructional input device. A close up of Fig. 5 of Michael, shown below, highlights a representative sampling of the input module apertures associated with the disclosed modular devices, in this case the keypads 61:



Closeup crop of Fig. 5 - Michael (annotated)

358. Michael discloses that the input module apertures are adjacent each of the at least two opposing sides of the plurality of sides of the computing device; *see* Michael ¶36, "Generally it is desirable that second and third compartment spaces are provided on opposing sides of the (first) compartment space for the personal electronic device. **This allows for input or output devices to be arranged on either side of the personal electronic device**." (emphasis added); see also Fig. 5, above.

359. Michael discloses that the input device is a separate and distinct structure from the docking port 3, forming no structural portion of the docking port; *see* Michael ¶45, "It will be appreciated then that **the device is completely modular in construction**. **Parts can be added and interchanged** while the

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device otherwise functions as an integral unit when assembled." (emphasis added). See also Fig. 5, above, showing the input devices as being separate and distinct from the docking port.

360. As also noted above, Park similarly discloses a pair of control modules with input module apertures securing the instructional input device. Signals from those input devices were communicated via the electrical connection in the bridge and the docking port in the sidewalls.

361. Therefore, Michael, in combination with Park, satisfies this claim limitation.

6. Claim element 1(e)(i): "a structural bridge securing the pair of confinement structures one to the other,"

362. Michael, in combination with Park, satisfies this limitation.

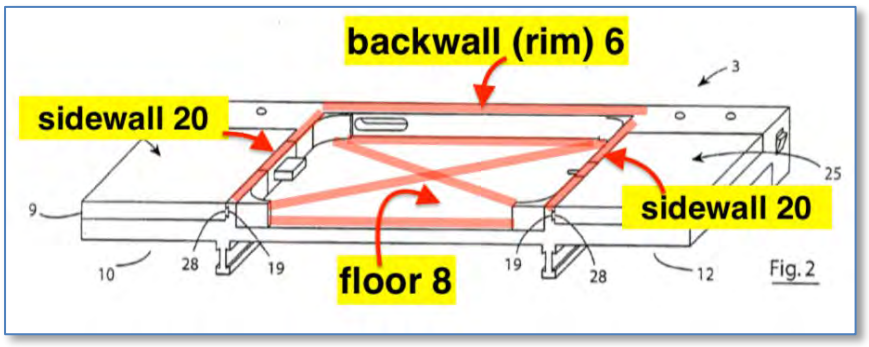
363. Michael discloses a docking station 3 that provides a frame or rim with a "floor pan or platform" to support the phone and connect the raised sidewalls 20, which are adjacent to and confine the computing device on at least two opposing sides; *see id*. ¶125, "The first compartment 1 is defined by a docking support in the form of a **frame or rim 6 having sidewalls** of suitable material…"; *also id.* at ¶127, "Sidewalls 20 define the edges of each compartment." (emphasis added).

364. The sidewalls 20 are secured by a structural bridge in the form of the pan or platform, or base (floor) 8, which "can support the back of the personal

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device one it has been docked within the first compartment"; *see* Michael ¶125. The base 8 and backwall 6 secure the pair of sidewalls 20 one to the other; *see id*. "The first compartment 1 is defined by a docking support in the form of a **frame or rim 6 having sidewalls** of suitable material… The rim 6 may extend about the compartment and be provided with a removable sidewall that can be removed to facilitate the removal of the docked personal device."

365. See Fig. 2 below:



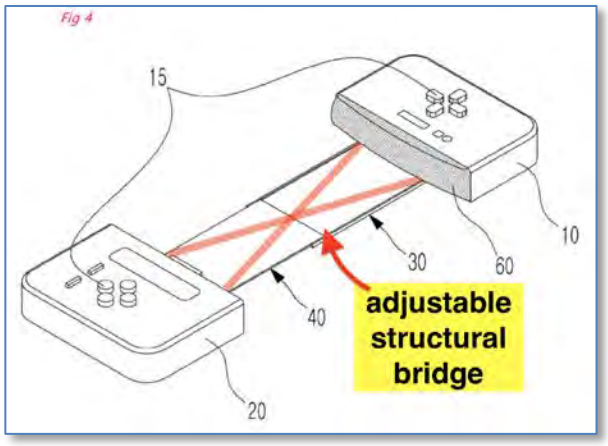
Michael Fig. 2 (annotated)

366. While Michael discloses a structural bridge, Michael alone does not disclose a structural bridge that cooperates with the sidewalls 20 through the use of a fastening mechanism, as required by claim element 1(f)(ii).

367. Park discloses such a structural bridge with a fastening mechanism, which, when combined with Michael's confinement structures, would satisfy the required claim elements. Park discloses a structural bridge which secures confining structures first body 10 and second body 20 one to the other; *see* Park Abstract, "**a bridge which connects that first body and the second body** and whose length is

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adjustable, and is characterized in that… **the first body and the second body respectively in contact with either side of the mobile phone**."

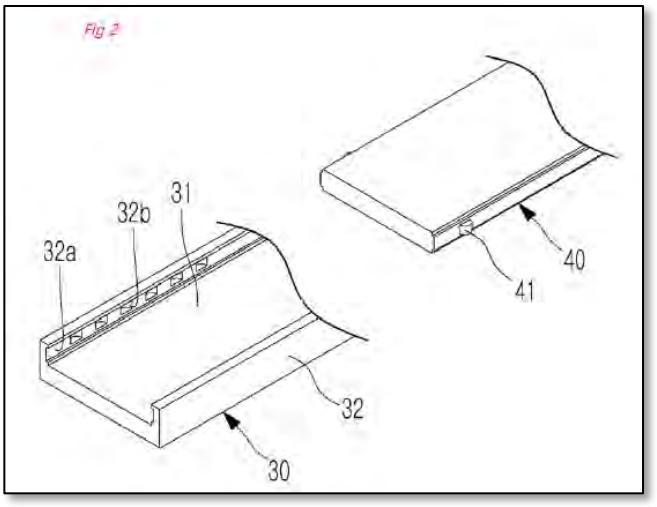


Park Fig. 4 (annotated)

368. As discussed below in more detail in my analysis of claim 1(f)(i), Park further discloses the structural bridge comprising a fastening mechanism cooperating with the first and second bodies 10 and 20, connecting them one to the other; see Park ¶39, "Describing a preferable embodiment with reference to Fig. 3, the second **panel (40) is inserted into the guide grooves (32a) of the first panel (30) so that it can move by sliding**. When a user wishes to mount a mobile phone (1), the first panel and second panel are extended to the left and right to provide sufficient space in which the mobile phone can be seated. Then, an interface connector provided on the mobile phone (1) is connected to the connecting terminal (21) provided on the second body (20), and the distance between the first panel and second panel is gradually reduced by bringing the panels together. **When the length desired by the user is reached, the protrusions (41) are made to**

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catch the catching holes (32b) at the current position...” (emphasis added). *see also* Park Fig. 2, annotated:



Park Fig. 2

369. Park provides a more robust, and adjustable, structural bridge for use in the type of game controller taught by Michael, and, when combined with Michael’s confinement structures, satisfies the required claim elements of the ’119 patent. Park's structural bridge improves Michael’s game controller device by allowing a user to adjust to accommodate different sized computing devices, which the market demanded and which provided a benefit to users given the variety of handheld computing devices available to the public. Such a design would work well with Michael’s controller because both are designed to provide two side controllers via a bridge that connects two confining structures, which in turn hold a smartphone or tablet.

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370. As I discuss above in reference to claim element 1(c), it would have been obvious for one of skill in the art to incorporate the adjustable structural bridge of Park, including its fastening mechanism, into Michael's control apparatus. In addition to the analysis regarding claim element 1(c), in Section VII above, "MOTIVATION TO COMBINE," I discuss a number of reasons why one of ordinary skill in the art would have been motivated to consider a combination of the teachings of Michael with Park.

371. Therefore, Michael, in combination with Park, satisfies this claim element.

7. Claim element 1(e)(ii): "in which each of the pair of control modules provide an attachment structure cooperating with the communication port, each attachment structure secures the input device to the communication port,"

372. Michael, in combination with Park, satisfies this claim element.

373. Michael discloses control modules which provide an attachment structure cooperating with the docking device, or communication port. For example, Michael teaches that its control modules attach to the device compartment via a guiding means, or track 19, that utilizes a rail to engage the modular control and attach to the docking device; each modular control had a rail that engaged the track 19 to hold it in place. Michael ¶129-30, 134. Additionally, each control module would plug into a connective arrangement; *see* Michael ¶130, "FIG. 1 also shows the arrangement of the modular devices. **Each modular device**

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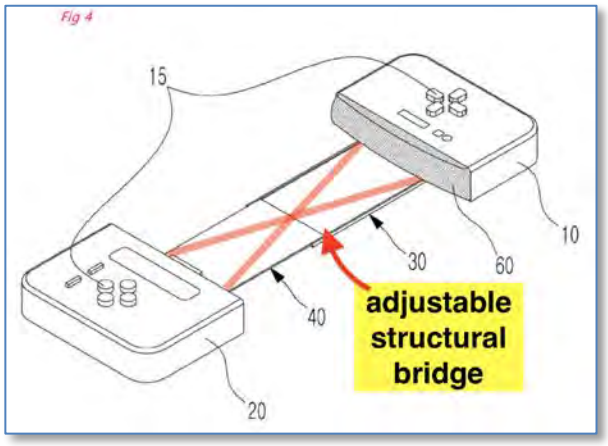
22, 23, 24, 25 and 26 comprises a male or female (in the embodiment male) connective arrangement 27 for engaging a corresponding female or male connective (in the embodiment female) arrangement 21 at the relevant compartment of the docking station." (emphasis added).

374. Michael discloses that each attachment structure secures the input device to the docking port; *see id.* ¶128, "The connective arrangement shown in FIG. 1 is **a port for receiving a plug on the modular device**, however the connective arrangement may be a terminal, jack or wiring. **The connective arrangement may further function as an anchoring means** to anchor the modular accessory within the additional compartment." (emphasis added).

375. While Michael does not disclose the claimed communication port, as it does not disclose confinement structures comprised of a fastening mechanism cooperating with a structural bridge, as I discuss above in reference to claim element 1(c), it would have been obvious for one of skill in the art to incorporate the adjustable structural bridge of Park, including its fastening mechanism, into Michael's control apparatus. In addition to the analysis regarding claim element 1(c), in Section VII above, "MOTIVATION TO COMBINE," I discuss a number of reasons why one of ordinary skill in the art would have been motivated to consider a combination of the teachings of Michael with Park.

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376. As previously explained, Park discloses such a structural bridge with a fastening mechanism, which, when combined with Michael's confinement structures, would satisfy the required claim elements. Park discloses a structural bridge which secures confining structures first body 10 and second body 20 one to the other; *see* Park Abstract, "**a bridge which connects that first body and the second body** and whose length is adjustable, and is characterized in that… **the first body and the second body respectively in contact with either side of the mobile phone**."

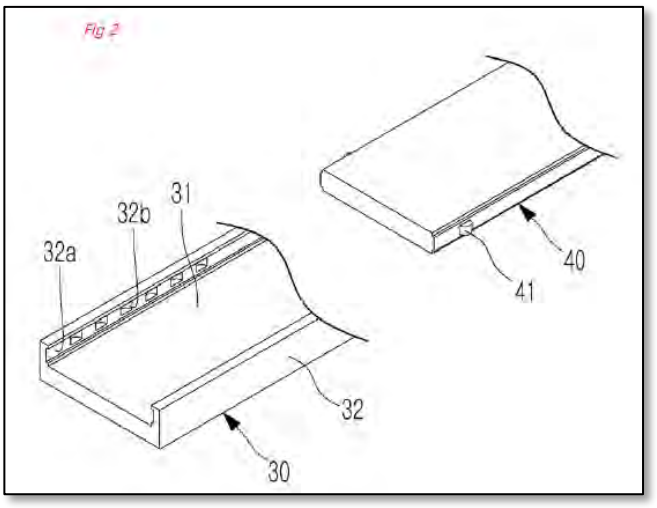


Park Fig. 4 (annotated)

377. Park further discloses the structural bridge comprising a fastening mechanism cooperating with the first and second bodies 10 and 20, connecting them one to the other; see Park ¶39, "Describing a preferable embodiment with reference to Fig. 3, the second **panel (40) is inserted into the guide grooves (32a) of the first panel (30) so that it can move by sliding**. When a user wishes to mount a mobile phone (1), the first panel and second panel are extended to the left

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and right to provide sufficient space in which the mobile phone can be seated. Then, an interface connector provided on the mobile phone (1) is connected to the connecting terminal (21) provided on the second body (20), and the distance between the first panel and second panel is gradually reduced by bringing the panels together. **When the length desired by the user is reached, the protrusions (41) are made to catch the catching holes (32b) at the current position**..." (emphasis added). *see also* Park Fig. 2, annotated:



Park Fig. 2

378. Park provides a more robust, and adjustable, structural bridge for use in the type of game controller taught by Michael, and, when combined with Michael's confinement structures, satisfies the required claim elements of the '119 patent. Park's structural bridge improves Michael's game controller device by allowing a user to adjust to accommodate different sized computing devices, which the market demanded and which provided a benefit to users given the variety of

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handheld computing devices available to the public. Such a design would work well with Michael's controller because both are designed to provide two side controllers via a bridge that connects two confining structures, which in turn hold a smartphone or tablet

379. Therefore, Michael, in combination with Park, satisfies this claim element.

8. Claim element 1(f)(i): "and in which the structural bridge comprising: a conduit between the pair of control modules;"

380. Michael, in combination with Park, satisfies this limitation.

381. Michael discloses that the control modules are operably connected; *see* Michael ¶17, "It will also be appreciated, that when the kit of the invention is in use, **the modular accessories are operably connected** to the personal electronic device"; *see also id*., ¶10," In particular the docking station provides a cradle into which the personal electronic device may be fitted, and **acts as an adapter**, allowing **various additional components to be functionally connected** to the personal electronic device." (emphasis added).

382. Michael discloses a desire to keep wiring "hidden from view," by running the wiring "internally in the assembly"; *see* Michael ¶43, "It is desirable that any connective arrangements such as ports, jacks, terminals, **wiring or the like** are accommodated **internally in the assembly so that they are hidden from**

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view in the assembly"; *see also id*. ¶140, "FIG. 4 also displays how any connective arrangements such as ports, jacks, terminals, **wiring or the like** are **accommodated internally in the assembly** so that they are **hidden from view** in the assembly."; *see also id*. ¶148, "FIG. 8 also illustrates how any connective arrangements such as ports, jacks, terminals, **wiring or the like are accommodated internally in the assembly**." (emphasis added).

383. A person of ordinary skill in the art would have known that a common way to run wire "internally in the assembly" would be through the use of a conduit. It would have been obvious to a POSITA to use at least one conduit to keep the wires of Michael "internal" and "hidden from view."

384. Park discloses an adjustable-length structural bridge which connects the first body and second body (i.e. the control modules) both mechanically and electrically*; see* Park ¶39, "The bridge (30, 40) whose length can be adjusted and fixed using the above-described method, **mechanically and electrically connects the first body (10) to the second body (20)**…" (emphasis added).

385. Park further discloses that the control modules, in the form of a first body and second body "equipped with key buttons," are "electrically connected by a connecting cable"*; see* Park Claim 1, "A game pad device for a mobile phone, comprising: a bridge that connects the first body and the second body and whose length is adjustable, and which is characterized in that: **the first body and the**

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second body are electrically connected by a connecting cable…" (emphasis added).

386. Park also discloses that the connecting cable runs inside the bridge*;* *see* Park ¶36, "**A connecting cable for electrically connecting the first body and second body (10, 20) electrically joins the first body and second body (10, 20)** which are separated from each other and provides the basis for a combined signal to be entered into a mobile phone (1) through a connecting terminal (21). It is connected to the first body (10) and **extends along a certain portion of the inside of the bridge** (30, 40), connecting to the second body (20)." (emphasis added)

387. Park discloses that the length of the bridge that carries the connecting cable is adjustable*; see* Park ¶32, "The bridge (30, 40) is basically in a shape similar to a rectangular parallelepiped having long edges and short edges and is provided to mechanically and electrically connect the first body and the second body (10, 20) **while being adjustable in length**."

388. One of skill in the art would understand that a wire being run through a mechanically-active environment, such as the inside of a sliding, retracting and expanding bridge, would necessarily be run through a conduit to physically protect the integrity of the wire. Therefore, it would have been obvious to one of skill in the art to run a conduit through the structural bridge of Park to connect the first and second control modules together with a physical wire.

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389. In my opinion, a POSITA would understand the term conduit to refer to a “closed tube for confining and protecting wires or cables” Based on my experience, the disclosures of Michael, and the disclosure of Park's routing of a wire through the bridge, it is my opinion that it would be obvious to include a conduit. More importantly, the use of conduit as properly construed would constitute nothing more than the use of known components (a conduit) as intended (to protect wires) with entirely predictable results.

390. Therefore, Michael, in combination with Park, renders this claim element obvious.

9. Claim element 1(f)(ii): “[the structural bridge comprising:] and a fastening mechanism cooperating with the pair of confinement structures, the fastening mechanism secures the pair of confinement structures one to the other.”

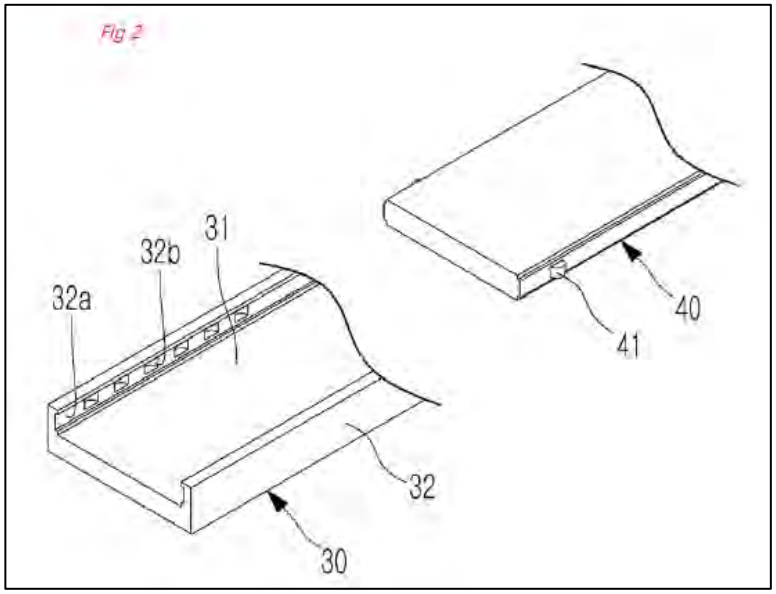
391. Michael, in combination with Park, satisfies this limitation.

392. While Michael discloses a structural bridge, it does not disclose the structural bridge comprising a fastening mechanism.

393. Park, however, discloses an adjustable structural bridge (30, 40) comprising a fastening mechanism in the form of a sliding and locking groove system. First panel 30 is the female side of the fastening mechanism, receiving panel 40. Panel 30 is comprised of recessed guide grooves 32a, with recessed catching holes 32b that are formed on the inside of the guide groove at certain intervals. Panel 40, the male component, is comprised of a matching structure

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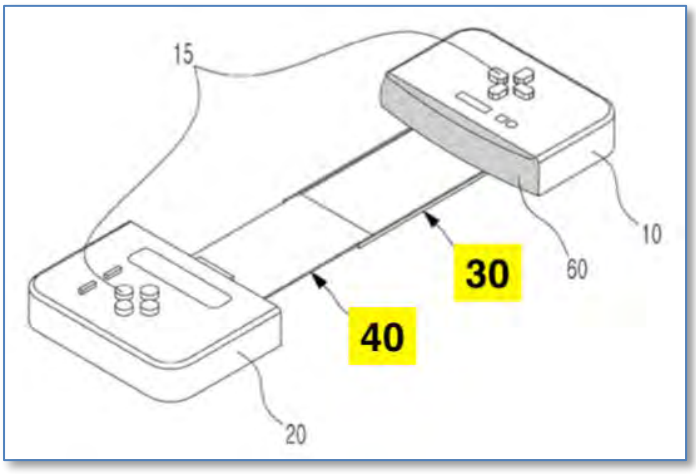
which fits into the guide grooves 32a of panel 30. Panel 40 is also comprised of protrusions 41, which are placed at certain intervals along the longitudinal direction. See Fig. 2 below:



Park Fig. 2

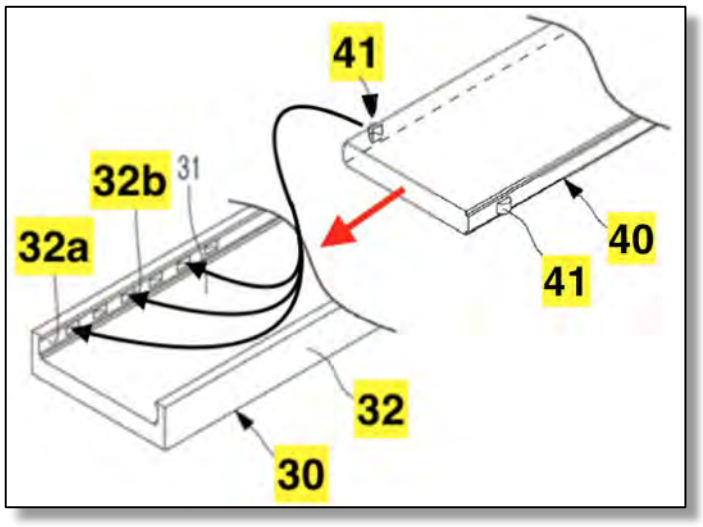
394. In operation, panel 40 is inserted into the guide grooves 32a of panel 30 so that panel 40 can move by sliding, thus adjusting the length of the structural bridge. To mount a mobile phone on the device, the bridge length is extended far enough to allow the phone to be place between the first body and the second body. See image below:

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Park Fig. 4 (annotated)

395. When the phone is in place, panel 40 is moved in by sliding until the desired length is reached (depending on the size of the mobile device) and the protrusions 41 catch the next catching hole 32b. See Fig. 2 (modified[50] and annotated) below:



Park Fig. 2 (modified and annotated)

[50] Fig. 2 as shown is modified to enhance the visibility of the predominantly hidden protrusion 41, which is found on the far wall of the panel 40.

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396. Park thus discloses the fastening mechanism of this claim element in the form of the panels 30 and 40, with their associated catch holes and protrusions. This structure is equivalent to the structure disclosed in the ’119 patent under the proper construction of fastening mechanism. Park's fastening mechanism cooperated with the two confinement structures and secured them one to the other because it secured the panels, and thus, would secure the two confinement structures of Michael together.

397. As I discuss above in reference to claim element 1(c), it would have been obvious for one of skill in the art to incorporate the adjustable structural bridge of Park, including its fastening mechanism, into Michael’s control apparatus. In addition to the analysis regarding claim element 1(c), in Section VII above, “MOTIVATION TO COMBINE,” I discuss a number of reasons why one of ordinary skill in the art would have been motivated to consider a combination of the teachings of Michael with Park.

398. In light of these disclosures, it is my opinion that the combination of Michael with Park satisfies this limitation and renders claim 1, as a whole, obvious.

10. Dependent Claim 2: “The combination of claim 1, further comprising a data storage device confined within the input device and communicating with the computing device.”

399. Michael, in combination with Park, renders this claim obvious.

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400. Michael discloses a data storage device as one of its modular input devices; *see* Michael ¶¶18-23, "Some examples of the types of modular devices contemplated for use within the present invention include… **memory devices**, processing units including CPU's and **hard drives**"; also *id*. ¶161, "**These modular accessories can be additional** power sources, **memory modules**…" (emphasis added). Michael also teaches that its input controllers could include touch screens/pads. *Id.* ¶¶20-21. A POSITA would have known that including memory and other computing components in a game controller module was standard in the art and obvious. Moreover, a POSITA would have been motivated to use these known components (computer components) as intended (to store and process data) to achieve predictable results (the storage of data for processing and communicating).

401. Michael also discloses that the modular accessories are in communication with the computing device; *see id.* ¶10, "In particular the docking station provides a cradle into which the personal electronic device may be fitted, and **acts as an adapter, allowing various additional components to be functionally connected to the personal electronic device**." (emphasis added).

402. Therefore, Michael, in combination with Park, renders this claim element obvious.

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11. Dependent Claim 3: "The combination of claim 1, further comprising an auxiliary power source confined within the input device and communicating with the computing device."

403. Michael, in combination with Park, renders this claim obvious.

404. Including a battery (auxiliary power source) in a controller that communicates with a computing device was standard in the art and known to a POSITA for its clear and obvious benefit of powering the device and charging the portable computer. Additionally, a POSITA would have been motivated to include an auxiliary power source, such as a rechargeable battery, in a detachable input device in communication with a computing device, as battery-powered, detachable input devices which could be recharged by the computing device were well known in the art since at least 2005.[51] Related to this point, Michael discloses an auxiliary power source confined within the input device and communicating with the computing device*; see* Michael ¶¶18-26, "Some examples of the types of modular devices contemplated for use within the present invention include… **power units including AC input devices and rechargeable or non-rechargeable batteries**."; also *id*. ¶127, "Compartment 13 is **arranged to receive a power source in the form of a battery pack 24** and in this embodiment the dimensions are larger than

[51] HowStuffWorks article on Xbox 360 Wireless Controller with rechargeable battery pack © 2005 - https://electronics.howstuffworks.com/xbox-three-sixty5.htm, Appendix Y

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the compartments 9, 10, 11 or 12, which are arranged to receive the smaller modular devices."; also *id*. ¶161, "**These modular accessories can be additional power sources**, memory modules…" (emphasis added).

405. Michael also discloses that the modular accessories are in communication with the computing device; *see id.* ¶10, "In particular the docking station provides a cradle into which the personal electronic device may be fitted, and **acts as an adapter, allowing various additional components to be functionally connected to the personal electronic device**." (emphasis added). As explained above, Park also taught a docking port for connecting to the mobile phone. Park ¶¶26, 28, Fig. 1. Thus, a POSITA would have known that utilizing a power source in the controller for communicating with the computing device is nothing more than utilizing known elements (batteries) as intended with predictable results (powering the controller and/or computer).

406. Therefore, Michael, in combination with Park, renders this claim obvious.

12. Dependent Claim 4: "The combination of claim 1, in which the instructional input device is a removable input device, and in which the removable input device passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

407. Michael, in combination with Park, renders this claim obvious.

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408. Michael discloses interchangeable modular accessories for controlling games on the portable phone connected via the cradle. Michael ¶¶10, 17, 52; *id.* 17, "It will be appreciated that **interchangeable modular accessories** will typically be interchanged for different functionality"; *see also id*. ¶17, "The interchangeable modular accessories will generally be **input** or output **devices**." (emphasis added). Further, Michael discloses that the instructional input device passes signals through the communication port and to the computing device via the docking port*; see id.* ¶10, "In particular the docking station provides a cradle into which the personal electronic device may be fitted, and **acts as an adapter, allowing various additional components to be functionally connected to the personal electronic device**." (emphasis added).

409. To a POSITA, particularly in light of Michael's teachings about the benefits of interchangeable controls, it would have been obvious to use removable instructional input devices on each detachable control module. Removable instructional input devices, or game control modules, were well known in the art, including Schoenith and the numerous examples discussed in the background section of this report (The MadCatz controller, Riggs, etc.). Thus, the use of removable instructional input devices would simply be the use of a known element as intended (on a gaming controller to allow different inputs) with entirely predictable results.

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410. Michael discloses controlling a game displayed on the display screen of the electronic device. First, by its very nature, this is what game controllers do in this type of device—the entire point of Michael is to allow control of applications on the phone via separate interchangeable control modules. In one place (¶196), Michael also explains, "In alternative embodiments the docking station may incorporate a motion sensor, which **can be used in gaming wherein control of the game is done through physical motion";** *see id*., ¶74, "**Games controllers** such as the touch sensitive screen and/or **push buttons of the type found on the Nintendo DS** are useful in particular configurations of the present invention." (emphasis added).

411. In my opinion, it would be obvious to one of ordinary skill in the art that Michael's description of an electronic device with "game controls" and "push buttons of the type found on the Nintendo DS" which "can be used in gaming" is, in fact, disclosing an instructional input device which passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device.

412. Park similarly discloses a computing device in the form of mobile phone 10. Park discloses an input device in the form of the first body and second body (10, 20) with instructional input devices in the form of buttons, d-pads, etc.*;* *see* Park ¶26, "…the game pad device for a mobile phone according to the present

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invention comprises by default : **a first body (10) on one side** of which (preferably the upper face) **are provided key buttons (15)**; **a second body (20)** that is distanced from the first body (10) **having key buttons (15)** on one side." (emphasis added).

413. Park further discloses that the input device passes signals through the communication port to the computing device 10*; see* Park ¶36, "**A connecting cable for electrically connecting the first body and second body** (10, 20) electrically joins the first body and second body (10, 20) which are separated from each other and **provides the basis for a combined signal to be entered into a mobile phone (1) through a connecting terminal (21)**."

414. Park discloses a system which generates control signals when buttons are pressed and sends those signals to a mobile phone device in order to affect the operation of the device*; see* Park ¶28, "The connecting terminal (21) is connected to an interface connector on the mobile phone (10) for connection with outside devices, and **inputs signals entered from the key buttons (15) according to the present invention to the mobile phone (10)**"*; see* also Park ¶30, " … in the first body and the second body (10, 20), **when a user presses a key button (15) provided on the upper face and generates the signal**, **the generated signal is entered into the game software running on the mobile phone** (1) through the connecting terminal (21) provided on the second body (20) to **carry out the basic**

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function of the game pad device for a mobile phone according to the present invention." (emphasis added).

415. In my opinion, it would be obvious to one of ordinary skill in the art that Park's description of an electronic device "carry[ing] out the basic function of the game pad device for a mobile phone" which sends key press signals which are "entered into the game software running on the mobile phone" is, in fact, disclosing an instructional input device which passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device.

416. Finally, the '119 patent discloses removable, game-related input devices which include joysticks, buttons and d-pads. *see* '119 patent, 4:22-40; also Fig. 1 (117). As discussed in my Background of the Technology section above, removable input devices such as these were well known in the art at the time of the '119 patent. For example, the Mad Catz ProModule controller system allowed a player to swap out game-related input devices, including joysticks, buttons, and d-pads, on its game control module.

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Mad Catz removable game control elements with attachment structures

417. Additionally, as discussed in my Background of the Technology section, U.S. Patent Application US 2005/0255915 A1 ("Riggs") teaches removable game input devices, including joysticks, buttons, and d-pads, which can be swapped out of a conventional game controller. See Riggs Fig. 3, Fig. 4, ¶¶ 30, 31, 33, "As illustrated specifically in FIGS. 3 and 4, each of the control devices is removably coupled to the control pad 12." Schoenith likewise taught that its input controls were removable and interchangeable. Schoenith 5:55-56.

418. While neither Michael nor Park explicitly disclose instructional input devices which are removable, based on the above teachings, it would have been obvious to one of ordinary skill in the art to deploy removable input devices on the Michael and Park game control modules. Video game playing is a very competitive activity. A serious game player may have a preference for the position of an individual input device (i.e. joystick, button or d-pad) on a handheld game controller as the position directly affects which finger they are using to control the

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specific input device. A simple example is a left-handed vs. right-handed gamer. A right-handed player may be more comfortable with the joystick located on the right, controlled by their dominant hand, as opposed to a left-handed player, who may want the joystick on the left side of the controller. A POSITA would have been motivated to make the instructional input devices of Michael and Park removable because it would have simply been an example of applying a known technique to a known device ready for improvement to yield the predictable and desirable result of giving the game player more flexibility on how to use their game controller to their maximum advantage.

419. In view of these disclosures, Michael, in view of Park, renders this claim obvious.

13. Dependent Claim 5: "The combination of claim 1, in which the instructional input device is a game control module, and in which the game control module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

420. Michael, in combination with Park, renders this claim obvious.

421. Michael discloses game control modules because it teaches input devices with buttons and d-pads, which are specifically provided for gaming. *See* Michael ¶20, "… controllers including control pads, touch pads, key pads, key boards, roller balls, joysticks, mouse devices, motion sensors, and other controllers such as **game controllers** and the like;" *see also id*., ¶74, "**Games controllers**

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such as the touch sensitive screen and/or **push buttons of the type found on the Nintendo DS** are useful in particular configurations of the present invention." (emphasis added).

422. As noted above, Michael discloses that the instructional input device passes signals through the communication port to the computing device*; see id.* ¶10, "In particular the docking station provides a cradle into which the personal electronic device may be fitted, and **acts as an adapter, allowing various additional components to be functionally connected to the personal electronic device**." (emphasis added).

423. As I discuss above in my analysis of claim 4, it would be obvious to one of ordinary skill in the art that Michael's description of an electronic device with "game controls" is, in fact, disclosing an instructional input device which passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device.

424. Park similarly discloses an input device which is a game control module, in the form of its "game pad device" with instructional input devices in the form of buttons and joysticks*; see* Park ¶26, "…the **game pad** device for a mobile phone according to the present invention…"; see id. ¶27, "The shape produced by their arrangement may also vary, and a **joystick** may be provided additionally…"; *see* also Park ¶30, " … in the first body and the second body (10, 20), **when a user**

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presses a key button (15) provided on the upper face and generates the signal, **the generated signal is entered into the game software running on the mobile phone** (1) through the connecting terminal (21) provided on the second body (20) to **carry out the basic function of the game pad device for a mobile phone** according to the present invention." (emphasis added).

425. As I discuss above in my claim 4 analysis, it would be obvious to one of ordinary skill in the art that Park's description of an electronic device "carry[ing] out the basic function of the game pad device for a mobile phone" which sends key press signals which are "entered into the game software running on the mobile phone" is, in fact, disclosing an instructional input device which passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device.

426. Therefore, Michael, in combination with Park, renders this claim obvious.

14. Dependent Claim 6: "The combination of claim 1, in which the instructional input device is a keyboard module, and in which the keyboard module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

427. Michael, in combination with Park, satisfies this claim limitation.

428. Michael discloses a removable keyboard module*; see* Michael, ¶20, "… controllers including control pads, touch pads, key pads, **key boards**, roller

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balls, joysticks, mouse devices, motion sensors, and other controllers such as game controllers and the like;" (emphasis added). A keyboard module is nothing more than a known user input means that has a combination of buttons or controls. Its use in the claimed context was known and would produce predictable results.

429. Michael discloses that the instructional input device passes signals through the communication port to the computing device*; see id.* ¶10, "In particular the docking station provides a cradle into which the personal electronic device may be fitted, and **acts as an adapter, allowing various additional components to be functionally connected to the personal electronic device**." (emphasis added).

430. As I discuss above in my analysis of claim 4, it would be obvious to one of ordinary skill in the art that Michael's description of an electronic device with "game controls" is, in fact, disclosing an instructional input device which passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device.

431. In light of these disclosures, Michael, in combination with Park, renders this claim element obvious.

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15. Dependent Claim 7: "The combination of claim 4, in which the removable instructional input device is a removable game control module."

432. Michael, in combination with Park, renders this claim limitation obvious.

433. As explained above, Michael discloses interchangeable control modules, which included game control modules; see Michael ¶17, "It will be appreciated that **interchangeable modular accessories** will typically be interchanged for different functionality." (emphasis added); *see id.* ¶20, "… controllers including control pads, touch pads, key pads, key boards, roller balls, joysticks, mouse devices, motion sensors, and other controllers such as **game controllers** and the like;" (emphasis added). To a POSITA, particularly in light of Michael's teachings about the benefits of interchangeable controls, it would have been obvious to use removable instructional input devices on each detachable control module. Removable instructional input devices, or game control modules, were well known in the art, including Schoenith and the numerous examples discussed in the background section of this report (The MadCatz controller, Riggs, etc.). Thus, the use of removable instructional input devices would simply be the use of a known element as intended (on a gaming controller to allow different inputs) with entirely predictable results.

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434. Park also teaches, as explained above, a variety of input controls that enabled control of a game running on a smart device. Park ¶¶ 27, 29.

435. In light of these teachings, POSITA would have understood that Michael's and Park's input controls—buttons, d-pads, joysticks—are game control modules that, as taught in Michael and other state of the art references like Schoenith, are removable and interchangeable.

436. Therefore, Michael, in combination with Park, renders this claim element obvious.

16. Dependent Claim 8: "The combination of claim 4, in which the removable instructional input device is a removable keyboard module."

437. Michael, in combination with Park, satisfies this claim limitation.

438. Michael discloses its modular control accessories are interchangeable; see Michael ¶17, "It will be appreciated that **interchangeable modular accessories** will typically be interchanged for different functionality." (emphasis added).

439. Michael also discloses that those modules could include removable keyboard module*; see* Michael, ¶20, "… controllers including control pads, touch pads, key pads, **key boards**, roller balls, joysticks, mouse devices, motion sensors, and other controllers such as game controllers and the like;" (emphasis added).

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440. In light of these teachings and those known to a POSITA, the use of a keyboard modules (a different type of known input means) would have been obvious to a POSITA. Therefore, Michael, in combination with Park, renders this claim obvious.

17. Dependent Claim 9: "The combination of claim 1, in which the structural bridge is a ridged structure."

441. Michael, in combination with Park, satisfies this claim limitation.

442. Michael taught that its cradle platform provided "rigid support" for accessories, which would inform a POSITA that its device is a rigid structure. Michael ¶74, 181. Park taught that its bridge comprised two sliding portions connected via a series of recessed catching holes and protrusions; see Park ¶¶9, 14, 33. Park further discloses that a benefit of the invention is to allow "for games to be enjoyed with the mobile phone stably seated." *see id*. ¶21. A POSITA would have understood such a teaching to require that the bridge be a rigid structure in order to properly function.

18. Dependent Claim 10: "The combination of claim 9, in which the rigid structural bridge is a removable rigid structure."

443. Michael, in combination with Park, renders this claim obvious. Michael taught that its docking device was detachable from the phone and accessory controllers. Thus, with Park's structural bridge linking the confinement

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structures of the combined Michael/Park device, the rigid structural bridge would be a removable rigid structure.

19. Dependent Claim 13: "The combination of claim 1, in which the communication link is a signal pathway."

444. Michael, in combination with Park, renders this claim obvious.

445. As noted above, Michael discloses that the control modules are operably connected; *see* Michael ¶17, "It will also be appreciated, that when the kit of the invention is in use, **the modular accessories are operably connected** to the personal electronic device"; *see also id*., ¶10, "In particular the docking station provides a cradle into which the personal electronic device may be fitted, and **acts as an adapter**, allowing **various additional components to be functionally connected** to the personal electronic device." (emphasis added).

446. One of ordinary skill in the art would understand the circuit disclosed by Michael, which connects the modular accessories and the personal electronic device, to be a signal pathway.

447. Similarly, Park's structural bridge teaches a communication link in the form of a connection cable running inside the bridge that connected the two side controllers. Park ¶36. This too is a signal pathway.

448. Therefore, Michael, in combination with Park, renders this claim element obvious.

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20. Dependent Claim 14: "The combination of claim 13, in which the signal pathway is a metallic pathway."

449. Michael, in combination with Park, renders this claim obvious.

450. In the previous claim analysis, I discuss Michael's disclosure of a communication link which is a signal pathway. Michael further discloses that the communication link may be a hard-wired connection; *see* Michael ¶43, "It is desirable that any connective arrangements such as ports, jacks, terminals, **wiring or the like** are accommodated internally in the assembly so that they are hidden from view in the assembly"; *see also id*. ¶140, "FIG. 4 also displays how any connective arrangements such as ports, jacks, terminals, **wiring or the like** are accommodated internally in the assembly so that they are hidden from view in the assembly."; *see also id*. ¶148, "FIG. 8 also illustrates how any connective arrangements such as ports, jacks, terminals, **wiring or the like** are accommodated internally in the assembly." (emphasis added).

451. Similarly, Park's structural bridge teaches a communication link in the form of a hard-wired cable running inside the bridge that connected the two side controllers. Park ¶36.

452. One skilled in the art would understand that a wire is a metallic conductor. Further, a POSITA would know that the use of a metallic pathway, or wire, is a known design option that would be used as expected (to provide a

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pathway for signals) to produce entirely predictable results (transmission of signals).

453. Therefore, Michael, in combination with Park, renders this claim obvious.

21. Dependent Claim 15: " The combination of claim 13, in which the signal pathway is a fiber optic pathway."

454. Michael, in combination with Park, renders this claim obvious. As noted above, Michael and Park each teach wired communication links that are signal pathways. A POSITA would have understood that a fiber optic pathway was a connection means that would have been known and would have operated as intended with predictable results—i.e., as a signal transmission means for communicating signals in an electronic device.

22. Dependent Claim 16: "The combination of claim 1, in which the communication link provides a communication platform."

455. Michael, in combination with Park, renders this claim obvious.

456. As discussed above, Michael discloses both wired and wireless communication links*; see* Michael ¶196, "Furthermore the docking station may have **WIFI capabilities** allowing **wireless connection to the Internet, wireless peer-to-peer connectivity or allowing connection to phone landlines**."; *see* Michael ¶43, "It is desirable that any **connective arrangements such as ports, jacks, terminals, wiring or the like** are accommodated internally in the assembly

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so that they are hidden from view in the assembly"; *see also id*. ¶140, "FIG. 4 also displays how any **connective arrangements such as ports, jacks, terminals, wiring or the like** are accommodated internally in the assembly so that they are hidden from view in the assembly." Park similarly taught a connection cable running inside the bridge that connected the two side controllers. Park ¶36.

457. In light of these disclosures, a POSITA would have found it obvious for the communication link to provide a communication platform.

23. Dependent Claim 17: "The combination of claim 16, in which the communication platform is a wired communication module."

458. Michael, in combination with Park, renders this claim obvious.

459. As discussed above, Michael discloses a wired communication platform; *see* Michael ¶43, "It is desirable that any connective arrangements such as ports, jacks, terminals, **wiring or the like** are accommodated internally in the assembly so that they are hidden from view in the assembly"; *see also id*. ¶140, "FIG. 4 also displays how any connective arrangements such as ports, jacks, terminals, **wiring or the like** are accommodated internally in the assembly so that they are hidden from view in the assembly."; *see also id*. ¶148, "FIG. 8 also illustrates how any connective arrangements such as ports, jacks, terminals, **wiring or the like** are accommodated internally in the assembly." (emphasis added). Park

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similarly taught a connection cable running inside the bridge that connected the two side controllers. Park ¶36.

460. Therefore, Michael, in combination with Park, renders this claim element obvious.

24. Dependent Claim 18: "The combination of claim 16, in which the communication platform is a wireless communication platform."

461. Michael, in combination with Park, renders this claim obvious.

462. Michael discloses a communication platform which is a wireless communication platform; *see* Michael ¶196, "Furthermore the docking station may have **WIFI capabilities** allowing **wireless connection** to the Internet, wireless peer-to-peer connectivity or allowing connection to phone landlines."; *see also id*. ¶¶18-29, "Some examples of the types of modular devices contemplated for use within the present invention include… other peripherals, including modems, **wireless enabling devices**…" (emphasis added).

463. In light of these disclosures, Michael, in combination with Park, renders this claim element obvious.

25. Dependent Claim 19: "The combination of claim 18, in which the wireless communication platform operates in a frequency range of 2.4 GHz."

464. Michael, in combination with Park, renders this claim obvious.

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465. Michael discloses a communication platform which is a wireless communication platform using WIFI technology; *see* Michael ¶196, "Furthermore the docking station may have **WIFI capabilities** allowing wireless connection to the Internet, wireless peer-to-peer connectivity or allowing connection to phone landlines." (emphasis added).

466. As one of ordinary skill in the art would know, WIFI wireless technology utilizes the 2.4 GHz frequency range for transmission*; see* Wired.com[52], "**You live your life at 2.4 GHz**. **Your router**, your cordless phone, your Bluetooth earpiece, your baby monitor and your garage opener all love and live on this radio frequency, and no others." (emphasis added)

467. Therefore, Michael, in combination with Park, renders this claim obvious.

26. Dependent Claim 20: "The combination of claim 18, in which the wireless communication platform is a personal area network."

468. Michael, in combination with Park, renders this claim obvious.

469. As discussed above in claim 16, Michael discloses a communication platform which is a wireless communication platform using WIFI technology; *see* Michael ¶196, "Furthermore the docking station may have **WIFI capabilities**

[52] https://www.wired.com/2010/09/wireless-explainer/, Appendix R

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allowing wireless connection to the Internet, **wireless peer-to-peer connectivity** or allowing connection to phone landlines." (emphasis added)

470. A *personal area network*, or PAN, is a computer network organized around an individual person, which is set up for personal use only.[53] Personal area networks are generally used to transmit data between nearby devices (i.e. peer-to-peer[54]), such as computers, phones, printers, game systems, game controllers and tablets. Personal area networks are often deployed with Bluetooth, though they can also be connected through a wireless (wifi) network.

471. One of ordinary skill in the art would recognize Michael's disclosure of wireless peer-to-peer connectivity as compatible with the term *personal area network.*

472. Therefore, Michael, in combination with Park, renders this claim element obvious.

27. Dependent Claim 21: "The combination of claim 18, in which the wireless communication platform utilizes infrared technology for data transactions."

473. Michael, in combination with Park, satisfies this claim limitation.

[53] https://www.lifewire.com/definition-of-pan-817889, Appendix S
[54] peer-to-peer – "denoting or relating to computer networks in which each computer can act as a server for the others, allowing shared access to files and peripherals without the need for a central server." Google Dictionary, Appendix T

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474. Michael discloses a communication platform which is a wireless communication platform; *see* Michael ¶196, "Furthermore the docking station may have **WIFI capabilities** allowing **wireless connection** to the Internet, wireless peer-to-peer connectivity or allowing connection to phone landlines."

475. Michael goes on to state, in ¶197, "It will be appreciated that **additional wireless connections** may be incorporated **to allow the user to interact with an additional interface unit such as a TV screen**."

476. While Michael does not explicitly cite infrared technology, a person of ordinary skill in the art would understand that a leading technology for wireless communication with televisions[55] is infrared. The mention of communication with televisions would motivate one of ordinary skill in the art to consider infrared as an alternate approach to signal transmission.

477. Therefore, Michael, in combination with Park, renders this claim element obvious.

[55] "Most remote controls **send signals using infrared radiation**…" *HOW REMOTE CONTROLS USE INFRARED BEAMS,* https://www.explainthatstuff.com/remotecontrol.html (Appendix U); *see also* "If you are like most Americans, you probably pick up **a TV remote control** at least once or twice a day. The remote control's job is to wait for you to press a key, and then to **translate that key-press into infrared (pronounced "infra-red") light signals that are received by the TV**." *INSIDE A TV REMOTE,* https://electronics.howstuffworks.com/inside-rc.htm (Appendix V)..

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478. In summary, based on the above analysis, it is my opinion that Michael, in combination with Park, renders obvious each of claims 1-10 and 13-21 of the ‘119 patent.

D. Obviousness Based on Willner in View of Park

479. The following sections provide an analysis that demonstrates how the combination of Willner and Park renders the claims 1, 3-10 and 13-21 obvious. As noted above, a POSITA would have had several reasons to combine the teachings of Willner and Park. Willner and Park, like the other references noted above, are each controllers designed to hold a smart phone or tablet in place and provide external control modules for use in gaming. The control modules, like all game controllers, provide buttons, joysticks, or other input devices for use in gaming. These controllers both solved a problem and satisfied market demand for products that enable a more enjoyable gaming experience on mobile touchscreen devices, as I explained above. Thus, a POSITA would have been knowledgeable about the teachings of both—including that the teachings of one would be applicable to the other given that they taught extremely similar devices.

1. Claim element 1(a): “A combination comprising:

480. Willner, in combination with Park, is a combination of claimed elements, as described below.

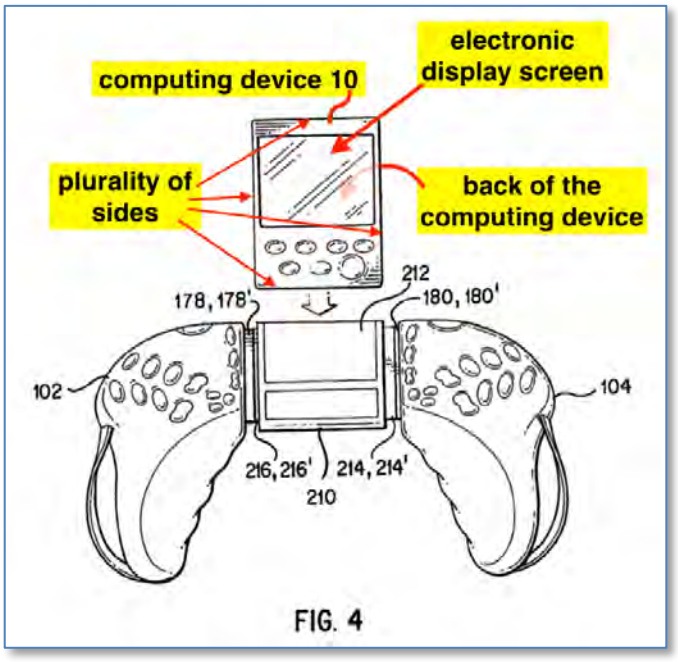
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2. Claim element 1(b): "a computing device, the computing device providing a plurality of sides, each of the plurality of sides are disposed between an electronic display screen of the computing device and a back of the computing device;"

481. Willner discloses a computing device, the computing device providing a plurality of sides, each of the plurality of sides [are] disposed between an electronic display screen of the computing device and a back of the computing device.

482. For instance, Fig. 4 of Willner discloses a computing device 10, which provides a plurality of sides, each of which are disposed between an electronic display screen 110 and a back of the computing device*; see* Willner ¶50 "Referring now to Fig. 4, there is shown the hand grippable combined keyboard and game controller system 100 which can communicate with a computer 20, as previously described, **as well as a palm/tablet sized computing device 10** which is received within an adaptor 210." (emphasis added).

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Willner Fig. 4 (annotated)

483. Park also disclosed a mobile-phone that had an electronic display screen, a plurality of sides that were disclosed between the display and the back of the device. Park Abstract, ¶¶1-2.

3. Claim element 1(c): "a communication port interacting with the computing device, the communication port providing a communication link and a pair of confinement structures, the pair of confinement structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device;"

484. Willner, in combination with Park, discloses a communication port interacting with the computing device, the communication port providing a communication link and a pair of confinement structures, the pair of confinement

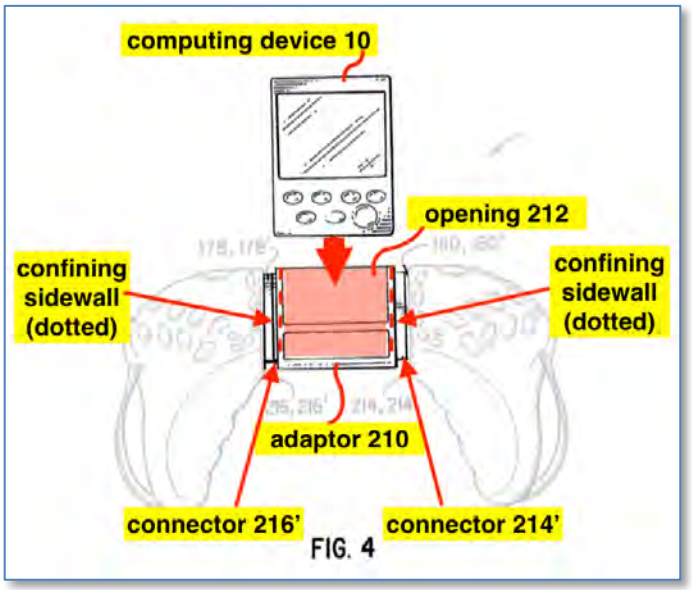
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structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device.

485. Willner discloses a communication port interacting with the computing device in the form of adaptor 210, which provides "an opening 212 into which the computing device 10 is received;" *see* Willner ¶50. As shown in Fig. 4, annotated and highlighted below for clarity, adaptor 210 receives the computing device 10, as indicated by the highlighted arrow. To facilitate this interaction, adaptor 210 is comprised of confinement structures in the form of sidewalls, which are adjacent to the computing device, establishing the opening 212. As shown, these highlighted sidewalls confine the computing device 10 on at least two opposing sides of the plurality of sides of the computing device.

486. Further, Willner discloses a communication link in the form of connectors 214' and 216', "provided with… adaptor 210;" *see id.* ¶51, which receive "the keystroke signals from each hand grippable unit;" *id.*

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Willner Fig. 4 (annotated/highlighted)

4. Claim element 1(d)(i): "an input device attached to and in electronic communication with the communication port;"

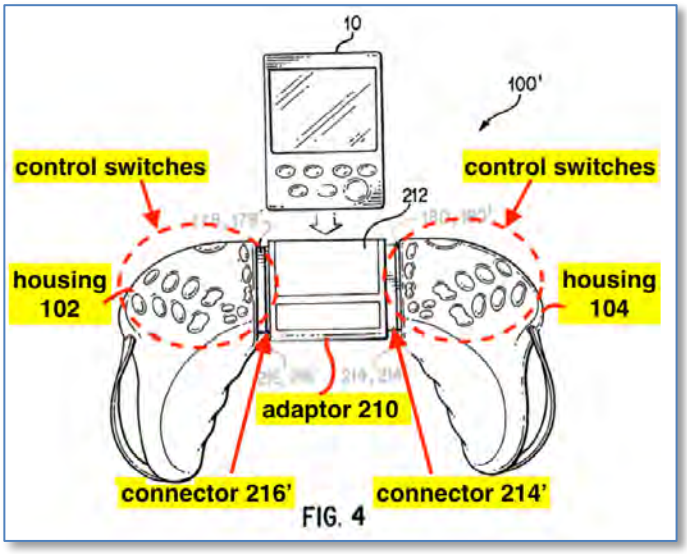
487. Willner, in combination with Park, discloses an input device attached to and in electronic communication with the communication port.

488. Willner discloses two housings 102 and 104 that provide an input device to the computing device 10; *see* Willner Abstract, "**One housing (102)** is provided with a first surface portion which **carries a group of first control switches (114)** and a hand grip portion (110) which **carries a group of third control switches (118)**. **The other housing (104)** includes a first surface portion (108) which **carries a group of second control switches (116)** and a hand grippable portion (112) which **carries a group of fourth control switches** (120)." (emphasis added).

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489. The two housings, including the integral control switches, are sometimes referred to as the "grippable units"; *see* Willner ¶46, "The tight fit between the first connecting portion 178 and the second connecting portion 180 provides a releasable coupling **between housings 102 and 104 that permits the housings to be integrally joined, when so desired, and subsequently easily separated into the separate hand grippable units**." (emphasis added).

490. The two housings, or grippable units, are in electronic communication with the communication port (adaptor 210) through at least the connectors 214' and 216', which are part of the adaptor 210*; see* Willner ¶51 "**Adaptor 210 is provided with complementary connectors 214′ and 216′** for **receiving the keystroke signals from each hand grippable unit**…" (emphasis added). See Fig. 4 below, annotated and highlighted for clarity:



Willner Fig. 4 (annotated/highlighted)

491. Park also teaches the claimed input device in the form of a pair of control modules that contain input devices (buttons, d-pad). Park ¶¶19, 26-27, 29, Figs. 1. Signals from those input devices were communicated via the electrical connection in the bridge and the docking port in the side body—thus, via the communication port.

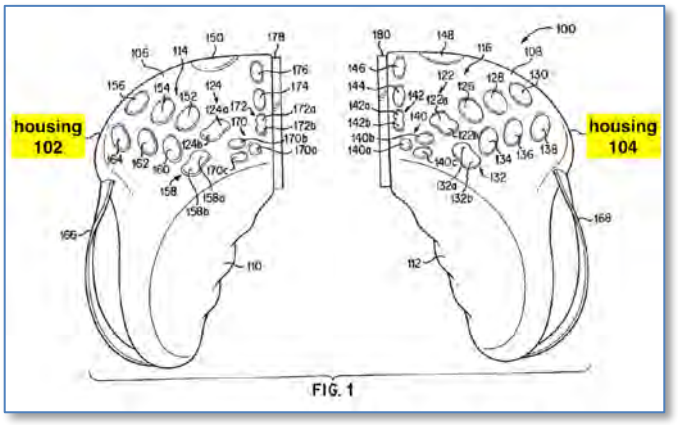
492. In light of these disclosures, Willner, in combination with Park, renders this claim element obvious.

5. Claim element 1(d)(ii): "the input device providing a pair of control modules, the pair of control modules providing input module apertures, each input module aperture secures an instructional input device, wherein said input module apertures are adjacent each of the at least two opposing sides of the plurality of sides of the computing device, and wherein the input device is a separate and distinct structure from the communication port, forming no structural portion of the communication port; and"

493. Willner, in combination with Park, teaches this claim limitation.

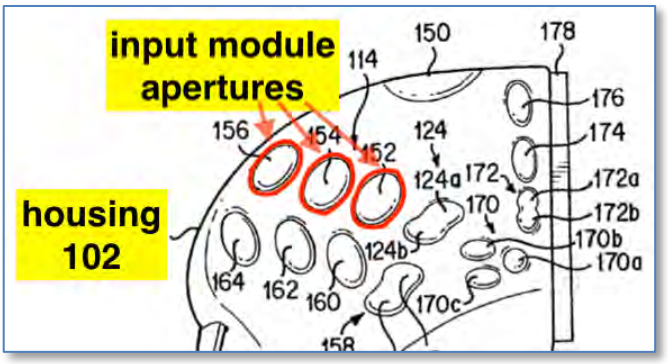
494. As discussed, Willner discloses an input device comprised of two control modules in the form of housings 102 and 104. For example, Fig. 1 of Willner shows housings 102 and 104, which include a variety of keys and switches "for gaming and control functions"; *see* Willner ¶27.

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Willner Fig. 1 (annotated)

495. As one of skill in the art would understand, these types of input devices (buttons, keys, etc.) feed through an opening (i.e. aperture) in the plastic casing of the control module. Therefore, in Willner, each of the control modules, in the form of housings 102 and 104, provides these input module apertures, which secure an instructional input device. The closeup below, taken from Fig. 1, highlights a representative subset of the input module apertures which secure the buttons and key input devices of Willner:

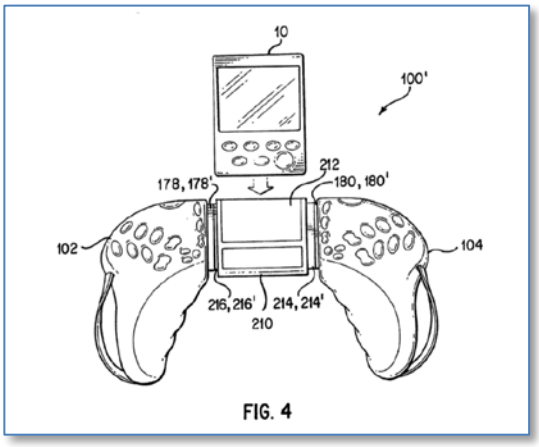


Closeup from Willner Fig. 1 (annotated)

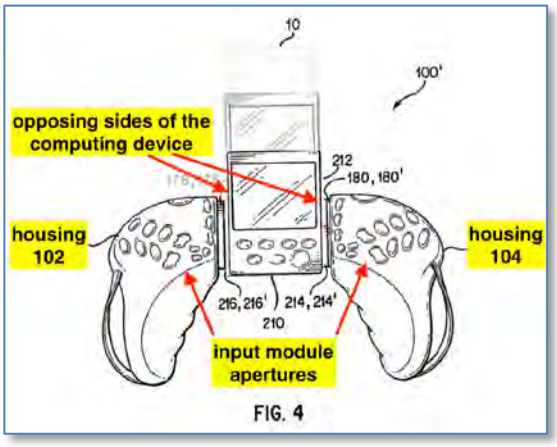
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496. Willner Fig. 4, shown below left, shows the computing device 10 separate from the communication port (adaptor 210), with an arrow indicating the disclosed insertion of the device into the adaptor 210; *see* Willner Abstract, "The adaptor (210) provides a docking port for coupling to a palm/tablet sized computing device (10)." A modified version of Fig. 4, below right, depicts the computing device 10 coupled to the adaptor 210, as disclosed by Willner.

497. When the computing device is received by the adaptor 210, as shown, the input module apertures are adjacent each of the at least two opposing sides of the plurality of sides of the computing device.



Willner – Fig. 4

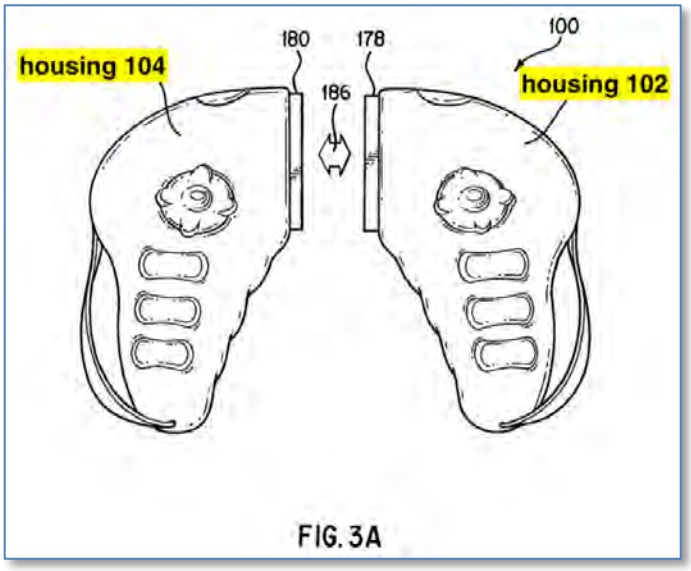


Willner – Fig. 4 (modified and annotated)

498. Willner discloses that the input device, comprised of the two housings 102 and 104, is a separate and distinct structure from the communication port, forming no structural portion of the communication port; *see* Willner ¶11, "Hand grippable combined keyboard and game controller system 100 is specifically directed to the concept of providing a keyboard data entry system which is divided

into **two separate and distinct housings**, each operated by a corresponding hand of the user, but which may be selectively joined together to be held and easily operated by the two hands of the user."

499. Finally, Fig. 3a of Willner further confirms that the housings are separate and distinct structures from the adaptor 210; see Willner ¶17, "Fig. 3A is a bottom plan view of the present invention indicating the method of joining the pair of housings thereof;"



Willner Fig. 3A (annotated)

500. Park's controller modules contain the same types of instructional input devices provided via an input aperture. Park ¶¶19, 26-27, 29, Figs. 1.

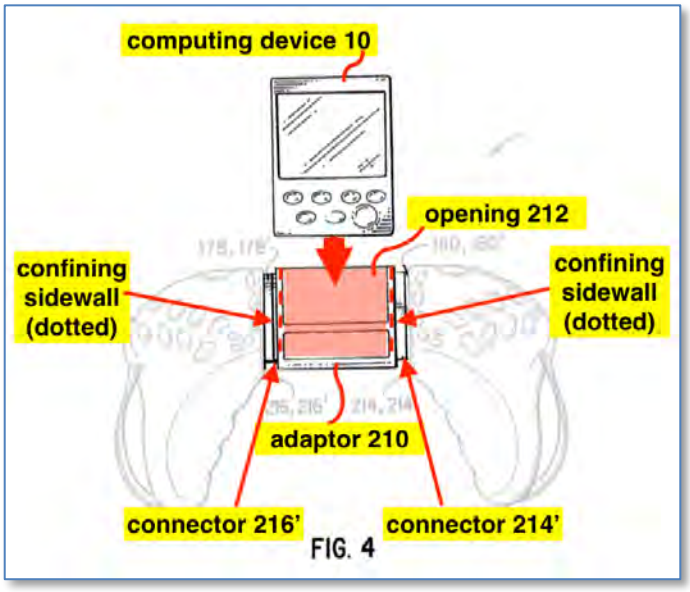
501. Therefore, Willner, in combination with Park, teaches this claim limitation.

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6. Claim element 1(e)(i): "a structural bridge securing the pair of confinement structures one to the other,"

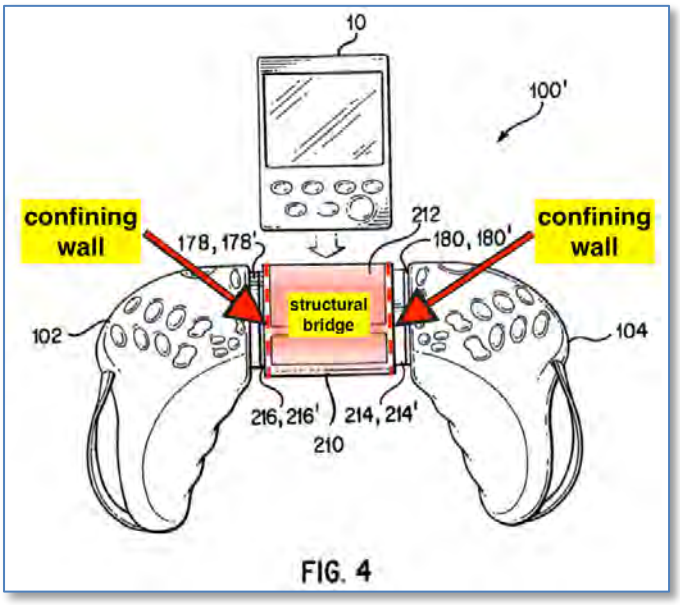
502. Willner, in combination with Park, discloses a structural bridge securing the pair of confinement structures one to the other.

503. As discussed above, Willner discloses confinement structures in the form of the sidewalls of the adaptor 210*; see* Willner ¶50, "Adaptor 210 is provided with an opening 212 into which the computing device 10 is received"; *see* also Willner Fig. 4, annotated and highlighted below:



Willner Fig. 4 (annotated/highlighted)

504. Willner additionally discloses a structural bridge in the form of the support (back) of the adaptor 210 which secures the sidewalls (i.e. pair of confinement structures) one to the other. See Fig. 4 below, annotated to highlight the structural bridge:

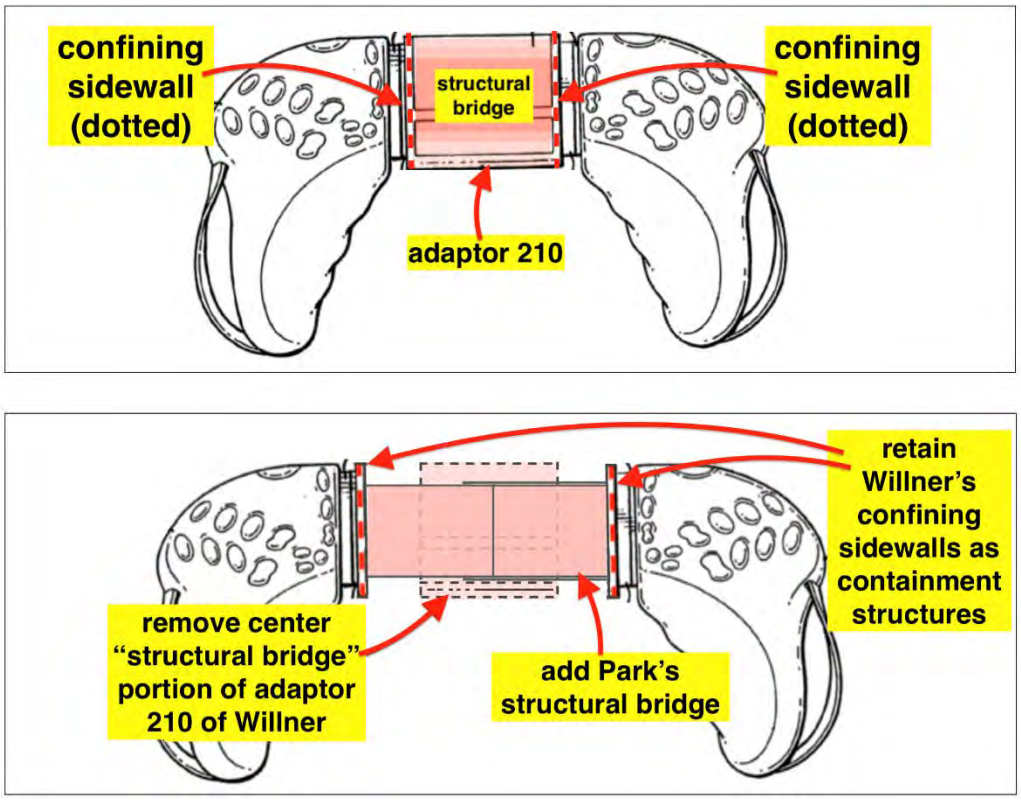


Willner Fig. 4 (annotated/highlighted)

505. To the extent one disagrees that Willner teaches a structural bridge, Park provides a more explicit teaching that a POSITA would have been motivated to combine with Willner's design. In particular, Park provides a more robust, and adjustable, structural bridge for use in the type of game controller taught by Willner (and the '119 patent). Park's bridge would allow a user to adjust to accommodate different sized computing devices, which the market demanded and which provided a benefit to users given the variety of handheld computing devices available to the public. Such a design would work well with Willner's controller because both are designed to provide two side controllers via a bridge that connects two confining structures, which in turn hold a smartphone or tablet. From an engineering standpoint, a POSITA would have recognized that removing the "structural bridge" of Willner (made up of the supporting back of the adaptor 210)

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and replacing it with the adjustable structural bridge of Park, while maintaining Willner's sidewalls 20 as the containment structures, would lead to an improved game control device. Given the technical similarity of the devices, this modification would have been low risk, yielding the predictable result of adding an adjustable width docking compartment. See the illustrations below, the top showing the current Willner disclosure and the bottom showing one possible way to combine Willner and Park:



Possible modification of Willner to incorporate teachings of Park

506. Therefore, Willner, in combination with Park, discloses a structural bridge securing the pair of confinement structures one to the other, rendering this claim term obvious.

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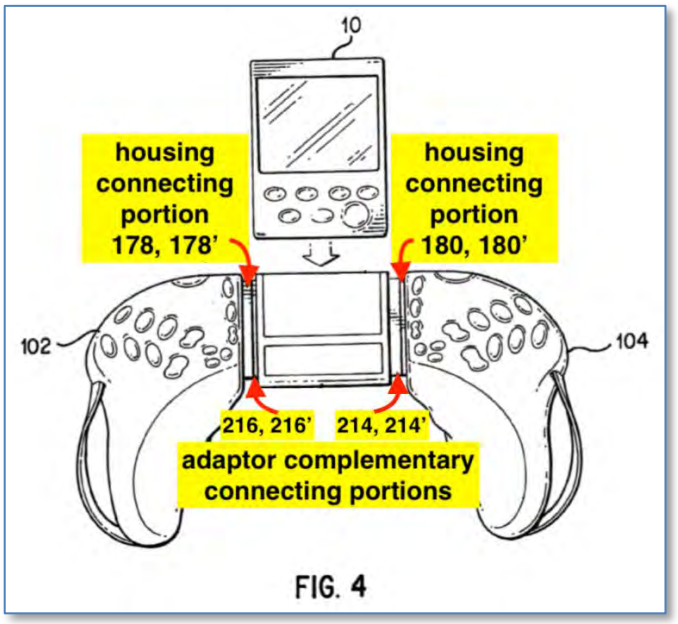
7. Claim element 1(e)(ii): "in which each of the pair of control modules provide an attachment structure cooperating with the communication port, each attachment structure secures the input device to the communication port,"

507. Willner, in combination with Park, discloses a pair of control modules which provide an attachment structure cooperating with the communication port, each attachment structure securing the input device to the communication port.

508. As explained above, Willner discloses control modules in the form of housings 102 and 104. These housings, or control modules, provide an attachment structure cooperating with the communication port (adaptor 210), each attachment structure securing the input device to the communication port*; see* Willner Abstract, "One housing (102) is provided with a **connecting portion (178, 178′)** and the other housing (104) is provided with a **connecting portion (180, 180′)**, the **complementary connecting portions allowing the two housings (102 and 104) to be… releasably coupled to an adaptor (210)**." (emphasis added).

509. See also Willner Fig. 4, annotated and highlight below:

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Willner Fig. 4 (annotated/highlighted)

510. Therefore, Willner, in combination with Park, teaches this claim element.

8. Claim element 1(f)(i): "and in which the structural bridge comprising: a conduit between the pair of control modules;"

511. Willner, in combination with Park, discloses a structural bridge comprising a conduit between the pair of control modules under Patent Owner's apparent construction of the term conduit.

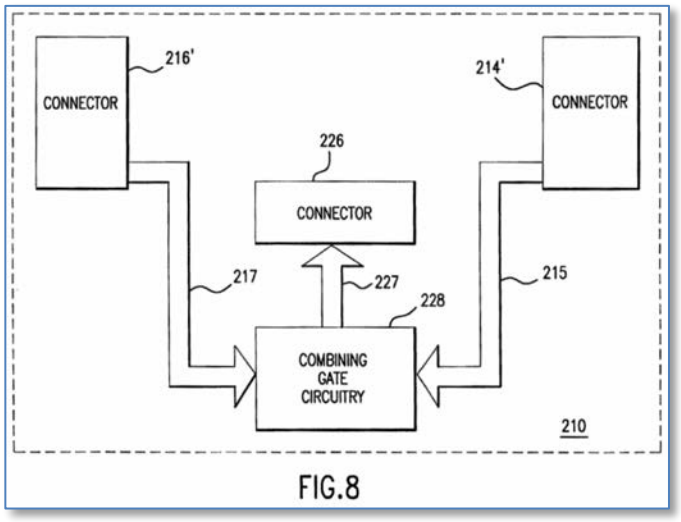
512. While Willner discloses a structural bridge in the form of the support (back) of the adaptor 210 which secures the sidewalls one to the other, it does not disclose the structural bridge comprising a conduit between the pair of control modules.

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513. However, as one of skill in the art would understand, a pair of control modules (input devices) which are used simultaneously to control a game must necessarily be electronically connected or have their signals combined in some way for the controllers to operate properly.

514. Willner discloses this requirement in ¶51 and in Fig. 8, showing the signals from the two control modules (housings), through connectors 214' and 216', being "coupled to the combining gate circuitry through the bus 215." The combined signal is then transferred to the bus 227 which connects to the computing device through the connector 226; *see* Willner ¶51, "As shown in FIG. 8, signals from the connector 216′ are coupled to the combining gate circuitry 228 through the bus 217. Similarly, signals are transferred from the connector 214′ to the combining gate circuitry 228 through the bus 215. **Combining gate circuitry 228 transfers the character, function, and symbol codes generated by each of the hand grippable units to the bus 227 which provides those codes to the computing device docking connector 226**, **for input to computing device 10**." (emphasis added). See Fig. 8 below:

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Willner Fig. 8

515. To that end, based on the above disclosures, an electrical connection (i.e., wire or other connection technology, such as busses 215 and 217 in Fig. 8) must connect the two control modules to each other or to a common circuit. If the control modules are physically connected together during operation (as they are in Willner), one skilled in the art would understand that a wire would be the simplest and most cost-effective way to make that connection.

516. However, as explained above, high volume, electronic toy products are generally engineered for endurance, as they are often handled by young children, who may not appreciate the fragility of electronic components. Therefore, it would have been obvious to one of skill in the art to connect the control modules of Willner with a physical wire running through a conduit, to protect the integrity of the wire. Therefore, it would have been obvious to one of skill in the art to run a conduit between the pair of control modules.

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517. Moreover, Park's teachings likewise satisfy this claim element in the combination of Willner and Park. Park discloses an adjustable-length structural bridge which connects the first body and second body (i.e. the control modules) both mechanically and electrically*; see* Park ¶39, "The bridge (30, 40) whose length can be adjusted and fixed using the above-described method, **mechanically and electrically connects the first body (10) to the second body (20)**…" (emphasis added).

518. Park further discloses that the control modules, in the form of a first body and second body "equipped with key buttons," are "electrically connected by a connecting cable"*; see* Park Claim 1, "A game pad device for a mobile phone, comprising: a bridge that connects the first body and the second body and whose length is adjustable, and which is characterized in that: **the first body and the second body are electrically connected by a connecting cable**…" (emphasis added).

519. Park also discloses that the connecting cable runs inside the bridge*; see* Park ¶36, "**A connecting cable for electrically connecting the first body and second body (10, 20) electrically joins the first body and second body (10, 20)** which are separated from each other and provides the basis for a combined signal to be entered into a mobile phone (1) through a connecting terminal (21). It is

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connected to the first body (10) and **extends along a certain portion of the inside of the bridge** (30, 40), connecting to the second body (20)." (emphasis added)

520. Park discloses that the length of the bridge that carries the connecting cable is adjustable*; see* Park ¶32, "The bridge (30, 40) is basically in a shape similar to a rectangular parallelepiped having long edges and short edges and is provided to mechanically and electrically connect the first body and the second body (10, 20) **while being adjustable in length**."

521. One of skill in the art would understand that a wire being run through a mechanically-active environment, such as the inside of a sliding, retracting and expanding bridge, would necessarily be run through a conduit to physically protect the integrity of the wire. Therefore, it would have been obvious to one of skill in the art to run a conduit through the structural bridge of Park to connect the first and second control modules together with a physical wire.

522. Further, it would have been obvious to apply the teachings of Park to Willner. The advantages of Park's adjustable bridge would have been obvious to one of skill in the art at the time of the '119 patent. At that point in the market (and before), there were dozens of mobile devices available from manufacturers such as Apple, Google, Samsung, LG and a host of companies marketing mobile devices compatible with Google's Android operating system. There is not, and was not at

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the time, a standard size for the height of a mobile device.[56] For example, Apple alone (one manufacturer out of dozens in the market), had at least 9 mobile products actively being used by 2012, representing 7 different heights[57] [58] [59]:

Model	**Release date**	**Height**
iPhone 3GS	2009	4.5 in.
iPhone 4	2010	4.5 in.
iPhone 4s	2011	4.5 in.
iPhone 5	2012	4.87 in.
iPad 1	2010	9.55 in.
iPad 2	2011	9.49 in.
iPad 3	2012	9.49 in.
iPad mini	2012	7.87 in.
iPad 4 mini	2012	8.00 in.

523. Because of this large variety of sizes, Park's adjustable bridge would have an obvious enhancement to Willner's controller accessory. One of skill in the art would have recognized that the feature would greatly expand the number of devices that an inventor's product would support while reducing the need to use multiple cradles, leading to the predictable result of having a larger base of potential customers.

[56] The height is the relevant dimension as the devices are used in a landscape mode in the inventions in question.
[57] http://socialcompare.com/en/comparison/apple-ipad-versions-compared-ipad-air-vs-ipad-mini, Appendix O
[58] https://www.cnbc.com/2017/06/29/every-iphone-released-in-order.html, Appendix P
[59] https://www.theiphonewiki.com/wiki/List_of_iPads, Appendix Q

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524. Earlier in my declaration[60] in Section VII, I discuss the fact that the products disclosed in Willner and Park fall within the same category of products - *associated controller accessories for handheld gaming computing devices*. For this reason, one skilled in the art would have been motivated to apply the teachings of Park to Willner as it is an example of improving similar devices in the same way. Also, as discussed in the above Section VII, Willner and Park were both addressing the same market need. Therefore, one skilled in the art would have been motivated to attempt a combination of Park and Willner because they would be applying a known technique (the adjustable bridge) to a known device (in the same market segment) to yield a predictable result.

525. Therefore, Willner, in combination with Park, satisfies this claim element.

9. Claim element 1(f)(ii): "[the structural bridge comprising:] and a fastening mechanism cooperating with the pair of confinement structures, the fastening mechanism secures the pair of confinement structures one to the other."

526. Willner, in combination with Park, satisfies this claim limitation.

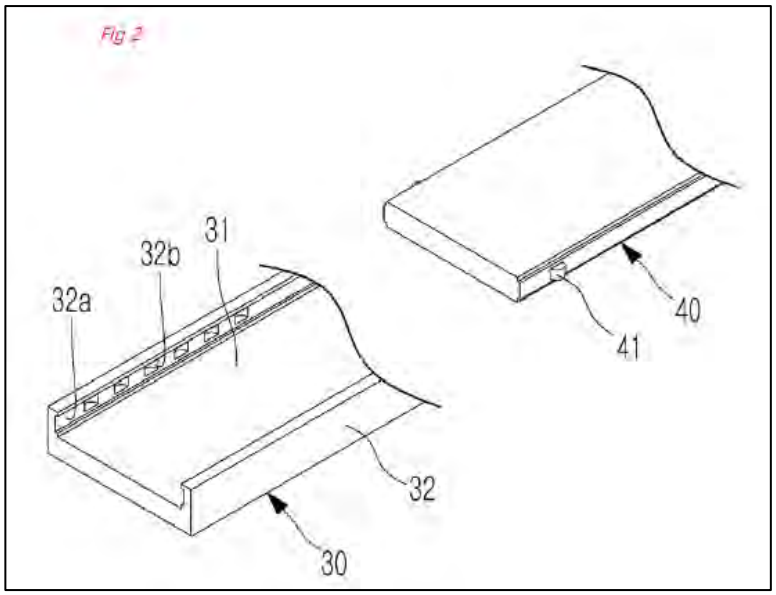
527. While Willner discloses a structural bridge in the form of the support (back) of the adaptor 210 which secures the sidewalls one to the other, it does not disclose the structural bridge comprising a fastening mechanism cooperating with

[60] See Section VII.

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the pair of confinement structures, the fastening mechanism secures the pair of confinement structures one to the other.

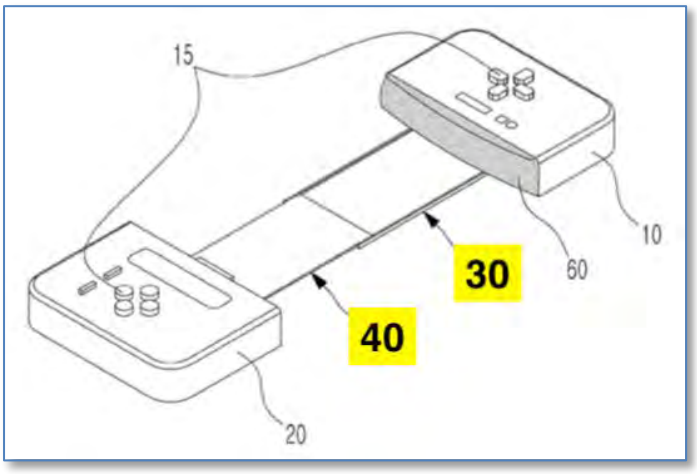
528. Park, however, discloses an adjustable structural bridge (30, 40) comprising a fastening mechanism in the form of a sliding and locking groove system. First panel 30 is the female side of the fastening mechanism, receiving panel 40. Panel 30 is comprised of recessed guide grooves 32a, with recessed catching holes 32b that are formed on the inside of the guide groove at certain intervals. Panel 40, the male component, is comprised of a matching structure which fits into the guide grooves 32a of panel 30. Panel 40 is also comprised of protrusions 41, which are placed at certain intervals along the longitudinal direction. See Fig. 2 below:



Park Fig. 2

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529. In operation, panel 40 is inserted into the guide grooves 32a of panel 30 so that panel 40 can move by sliding, thus adjusting the length of the structural bridge. To mount a mobile phone on the device, the bridge length is extended far enough to allow the phone to be placed between the first body and the second body. See image below:

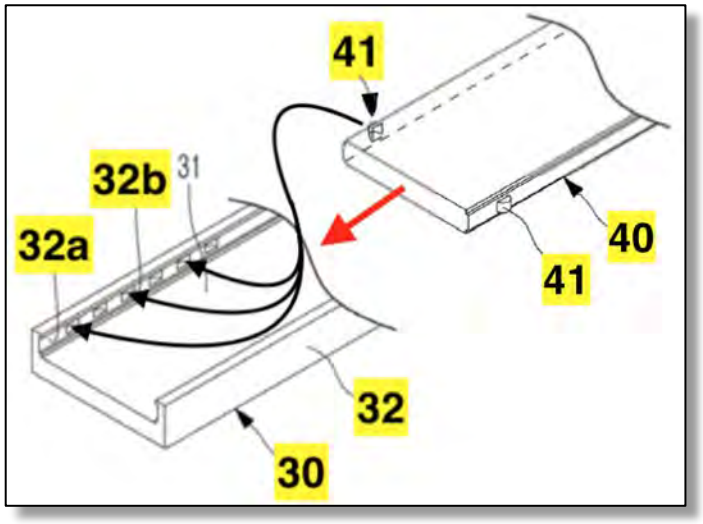


Park Fig. 4 (annotated)

530. When the phone is in place, panel 40 is moved in by sliding until the desired length is reached (depending on the size of the mobile device) and the protrusions 41 catch the next catching hole 32b. See Fig. 2 (modified[61] and annotated) below:

[61] Fig. 2 as shown is modified to enhance the visibility of the predominantly hidden protrusion 41, which is found on the far wall of the panel 40.

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Park Fig. 2 (modified and annotated)

531. Park thus discloses the fastening mechanism of this claim element in the form of the panels 30 and 40, with their associated catch holes and protrusions. This structure is equivalent to the structure disclosed in the ’119 patent under the proper construction of fastening mechanism. Park's fastening mechanism cooperated with the two confinement structures and secured them one to the other because it secured the panels, and thus, would secure the two separate raised walls of Schoenith together. In my opinion, it would have been obvious to one of skill in the art to combine the adjustable bridge of Park (including its fastening mechanism) with Willner.

532. The advantages of Park’s adjustable bridge would have been obvious to one of skill in the art at the time of the ‘119 patent. As already explained, at that point in the market, there were dozens of mobile devices available from manufacturers such as Apple, Google, Samsung, LG and a host of companies

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marketing mobile devices compatible with Google's Android operating system. There is not, and was not at the time, a standard size for the height of a mobile device.[62] For example, Apple alone (one manufacturer out of dozens in the market), had at least 9 mobile products actively being used in 2012, representing 7 different heights[63] [64] [65]:

Model	**Release date**	**Height**
iPhone 3GS	2009	4.5 in.
iPhone 4	2010	4.5 in.
iPhone 4s	2011	4.5 in.
iPhone 5	2012	4.87 in.
iPad 1	2010	9.55 in.
iPad 2	2011	9.49 in.
iPad 3	2012	9.49 in.
iPad mini	2012	7.87 in.
iPad 4 mini	2012	8.00 in.

533. Because of this large variety of sizes, Park's adjustable bridge would have an obvious enhancement to Willner's controller accessory. One of skill in the art would have recognized that the feature would greatly expand the number of

[62] The height is the relevant dimension as the devices are used in a landscape mode in the inventions in question.
[63] http://socialcompare.com/en/comparison/apple-ipad-versions-compared-ipad-air-vs-ipad-mini, Appendix O
[64] https://www.cnbc.com/2017/06/29/every-iphone-released-in-order.html, Appendix P
[65] https://www.theiphonewiki.com/wiki/List_of_iPads, Appendix Q

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devices that an inventor's product would support, leading to the predictable result of having a larger base of potential customers.

534. Earlier in my declaration[66] in Section VII, I discuss the fact that the products disclosed in Willner and Park fall within the same category of products - *associated controller accessories for handheld gaming computing devices*. For this reason, one skilled in the art would have been motivated to apply the teachings of Park to Willner as it is an example of improving similar devices in the same way. Also, as discussed in the above Section VII, Willner and Park were both addressing the same market need. Therefore, one skilled in the art would have been motivated to attempt a combination of Park and Willner because they would be applying a known technique (the adjustable bridge) to a known device (in the same market segment) to yield a predictable result.

535. Therefore, Willner, in combination with Park, satisfies this claim element. As a whole, the combination of Willner and Park renders claim 1 obvious.

10. Dependent Claim 2: "The combination of claim 1, further comprising a data storage device confined within the input device and communicating with the computing device."

536. Willner, in combination with Park, discloses a data storage device confined within the input device and communicating with the computing device.

[66] See Section VII.

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537. Willner discloses a data storage device confined within one of its input devices in the form of a non-volatile memory stored in one of its housings 102 or 104. In ¶39, Willner discusses the remapping of characters and symbols on the keyboard layouts of its housings (input devices) 102 or 104 - "… the generation of numeric characters and symbols can also be subject to remapping, so that a single housing may be utilized to generate all of the characters, functions and symbols normally generated through the use of both housing 102 and housing 104." Continuing, Willner discloses storing these remapping assignments in a data storage device in the housing; *see* Willner ¶41, "The QWERTY compatible key assignments may be stored in a non-volatile memory and selectively activated by utilization of a switch or combination of switches."

538. A POSITA would have known that including memory and other computing components in a game controller module was standard in the art and obvious. Moreover, a POSITA would have been motivated to use these known components (computer components) as intended (to store and process data) to achieve predictable results (the storage of data for processing and communicating).

539. Willner also discloses that the housings are in communication with the computing device; *see id.* ¶40, "In the game controller mode, each of the first control switch grouping 114 and third control switch grouping 118, and the second control switch grouping 116 and the fourth control switch grouping 120 provide

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switch closure input signals that are output to a computer's game port, serial port, USB port, or parallel port, or may be coupled to an input port in a dedicated game system."

540. Therefore, Willner, in combination with Park, renders this claim element obvious.

11. Dependent Claim 3: "The combination of claim 1, further comprising an auxiliary power source confined within the input device and communicating with the computing device."

541. Willner, in combination with Park, renders this claim obvious. As discussed above in my claim 1 analysis, Willner discloses input devices in the form of the housings 102 and 104. Willner also discloses a computing device in the form of the computing device 10.

542. Willner further discloses a power source in the form of batteries confined within the input device (the housings); *see* Willner ¶43, "Although not shown, **each of housings 102 and 104 includes a battery compartment which contains the power source for operation of the circuitry associated with converting the switch closures to particular computer input signals**…" (emphasis added). As the batteries are disclosed as the "power source for… circuitry associated with converting the switch closures to… computer input

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signals," Willner therefore discloses a power source communicating with the computing device.

543. Park likewise taught a docking port for connecting to the mobile phone. Park ¶¶26, 28 (connecting terminal 21), Fig. 1. One having skill in the art would have known that utilizing a power source in the controller that could communicate with the computing device is nothing more than utilizing known elements (e.g., batteries) as intended (to provide power) with predictable results (the computing device receives power).

544. In light of these teachings, Willner, in combination with Park, renders this claim obvious.

12. Dependent Claim 4: "The combination of claim 1, in which the instructional input device is a removable input device, and in which the removable input device passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

545. Willner, in combination with Park, renders this claim obvious.

546. My analysis of claim element 1(d)(i), discusses Willner's disclosure that the input device passes signals to the communication port (adaptor 210); *see* Willner ¶51 "**Adaptor 210 is provided with complementary connectors 214′ and 216′** for **receiving the keystroke signals from each hand grippable unit**…" (emphasis added). Willner further discloses that these input device signals are passed from the communication port to the computing device; *see* Willner ¶51, "As

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shown in FIG. 8, signals from the connector 216′ are coupled to the combining gate circuitry 228 through the bus 217. Similarly, signals are transferred from the connector 214′ to the combining gate circuitry 228 through the bus 215. **Combining gate circuitry 228 transfers the character, function, and symbol codes generated by each of the hand grippable units to the bus 227 which provides those codes to the computing device docking connector 226**, **for input to computing device 10**." (emphasis added).

547. Willner discloses that the input device signals control images displayed on the display screen of the computing device; see Willner ¶40, "In the game controller mode, each of the first control switch grouping 114 and third control switch grouping 118, and the second control switch grouping 116 and the fourth control switch grouping 120 **provide switch closure input signals that are output** to a computer's game port, serial port, USB port, or parallel port, or may be **coupled to an input port of a dedicated gaming system**… particular switches of the control switch grouping 114, 116 may be utilized to **provide directional inputs to the game software**. Alternately, the cursor control grouping 140, 170 could be utilized as **directional inputs to a game**. Other switches of the switch groupings 114, 116, 118, 120 can be utilized for input of individual switch closures that are **used by the game software to control the firing of weapons and/or**

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provide control of particular maneuvers of the game icons, such as jumping, flying, and the like." (emphasis added).

548. Park similarly discloses a computing device in the form of mobile phone 10. Park discloses an input device in the form of the first body and second body (10, 20) with instructional input devices in the form of buttons, d-pads, etc.*; see* Park ¶26, "…the game pad device for a mobile phone according to the present invention comprises by default : **a first body (10) on one side** of which (preferably the upper face) **are provided key buttons (15)**; **a second body (20)** that is distanced from the first body (10) **having key buttons (15)** on one side." (emphasis added).

549. Park further discloses that the input device passes signals through the communication port to the computing device 10*; see* Park ¶36, "**A connecting cable for electrically connecting the first body and second body** (10, 20) electrically joins the first body and second body (10, 20) which are separated from each other and **provides the basis for a combined signal to be entered into a mobile phone (1) through a connecting terminal (21)**."

550. Park discloses a system which generates control signals when buttons are pressed and sends those signals to a mobile phone device in order to affect the operation of the device*; see* Park ¶28, "The connecting terminal (21) is connected to an interface connector on the mobile phone (10) for connection with outside

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devices, and **inputs signals entered from the key buttons (15) according to the present invention to the mobile phone (10)**"*; see* also Park ¶30, " … in the first body and the second body (10, 20), **when a user presses a key button (15) provided on the upper face and generates the signal**, **the generated signal is entered into the game software running on the mobile phone** (1) through the connecting terminal (21) provided on the second body (20) to **carry out the basic function of the game pad device for a mobile phone** according to the present invention." (emphasis added).

551. In my opinion, it would be obvious to one of ordinary skill in the art that Park's description of an electronic device "carry[ing] out the basic function of the game pad device for a mobile phone" which sends key press signals which are "entered into the game software running on the mobile phone" is, in fact, disclosing an instructional input device which passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device.

552. The '119 patent discloses removable, game-related input devices which include joysticks, buttons and d-pads. *see* '119 patent, 4:22-40; also Fig. 1 (117). As discussed in my Background of the Technology section above, removable input devices such as these were well known in the art at the time of the '119 patent. For example, the Mad Catz ProModule controller system allowed a

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player to swap out game-related input devices, including joysticks, buttons, and d-pads, on its game control module.





Mad Catz removable game control elements with attachment structures

553. Additionally, as discussed in my Background of the Technology section, U.S. Patent Application US 2005/0255915 A1 ("Riggs") teaches removable game input devices, including joysticks, buttons, and d-pads, which can be swapped out of a conventional game controller. See Riggs Fig. 3, Fig. 4, ¶¶ 30, 31, 33, "As illustrated specifically in FIGS. 3 and 4, each of the control devices is removably coupled to the control pad 12."

554. While neither Willner nor Park explicitly disclose instructional input devices which are removable, based on the above teachings, it would have been obvious to one of ordinary skill in the art to deploy removable input devices on the Willner and Park game control modules. Video game playing is a very competitive activity. A serious game player may have a preference for the position of an individual input device (i.e. joystick, button or d-pad) on a handheld game

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controller as the position directly affects which finger they are using to control the specific input device. A simple example is a left-handed vs. right-handed gamer. A right-handed player may be more comfortable with the joystick located on the right, controlled by their dominant hand, as opposed to a left-handed player, who may want the joystick on the left side of the controller. A POSITA would have been motivated to make the instructional input devices of Willner and Park removable because it would have simply been an example of applying a known technique to a known device ready for improvement to yield the predictable and desirable result of giving the game player more flexibility on how to use their game controller to their maximum advantage.

555. In light of these teachings, Willner, in combination with Park, renders this claim obvious.

13. Dependent Claim 5: "The combination of claim 1, in which the instructional input device is a game control module, and in which the game control module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

556. Willner, in combination with Park, renders this claim obvious. As discussed in my analysis for claim 4, both Willner and Park disclose an instructional input device which passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device. One of ordinary skill in the art would have

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recognized the left and right housings of Willner, and the first body and second body of Park, as game control modules, as they both contain input devices, such as buttons, d-pads, and joysticks (among others) that are specifically provided for controlling gaming applications. Consequently, both Willner and Park disclose an instructional input device that satisfies this claim. Willner, in combination with Park, renders this claim obvious.

14. Dependent Claim 6: "The combination of claim 1, in which the instructional input device is a keyboard module, and in which the keyboard module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

557. Willner, in combination with Park, renders this claim obvious. As discussed above in my claim 1 analysis, Willner discloses input devices in the form of the left and right housings 102 and 104. Willner also discloses a computing device in the form of the computing device 10. As discussed above in my analysis of dependent claim 5, Willner and Park each disclose an instructional input device which passes signals through the communication port to the computing device, with those signals controlling images displayed on the display screen of the computing device.

558. Furthermore, Willner discloses an instructional input device which is a keyboard; *see* Willner ¶25, "Hand grippable combined **keyboard** and game controller system 100 is specifically directed to the concept of providing a

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keyboard data entry system which is divided into two separate and distinct housings, each operated by a corresponding hand of the user, but which may be selectively joined together to be held and easily operated by the two hands of the user. Hand grippable combined keyboard and game controller system 100 **provides the functions of a fully functional 101 key keyboard** for communication with a computer system 20"; also *id*. ¶10, "It is therefore a feature of the invention to provide a pair of hand grippable controllers **which together function as a keyboard**"; also id. ¶27, "In addition to the two-position switches, the control switch groupings 114, 116 include switches 152, 154, 156, 160, 162, and 164, 126, 128, 130, 134, 136, and 138 **for keyboard entry**…" (emphasis added).

559. Park likewise teaches that a variety of instructional input devices or controls could be used. Park ¶¶19, 29, "[I]t goes without saying that they key buttons (15) are not limited to a particular shape and function.".

560. Therefore, Willner, in combination with Park, renders this claim obvious.

15. Dependent Claim 7: "The combination of claim 4, in which the removable instructional input device is a removable game control module."

561. The combination of Willner with Park renders this claim obvious for the same reasons as claims 4 and 5. A POSITA would have understood that

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Willner's and Park's input controls (buttons, d-pads, joysticks) are game control modules.

562. In addition, as discussed above in my analysis of dependent claim 4, a person of ordinary skill in the art at the time of the '119 patent would have been familiar with removable input devices. Therefore, it would have been obvious to one of ordinary skill in the art to deploy removable input devices on the Willner and Park game control modules. Making the instructional input devices of Willner and Park removable would have simply been an example of applying a known technique to a known device ready for improvement to yield predictable results.

16. Dependent Claim 8: "The combination of claim 4, in which the removable instructional input device is a removable keyboard module."

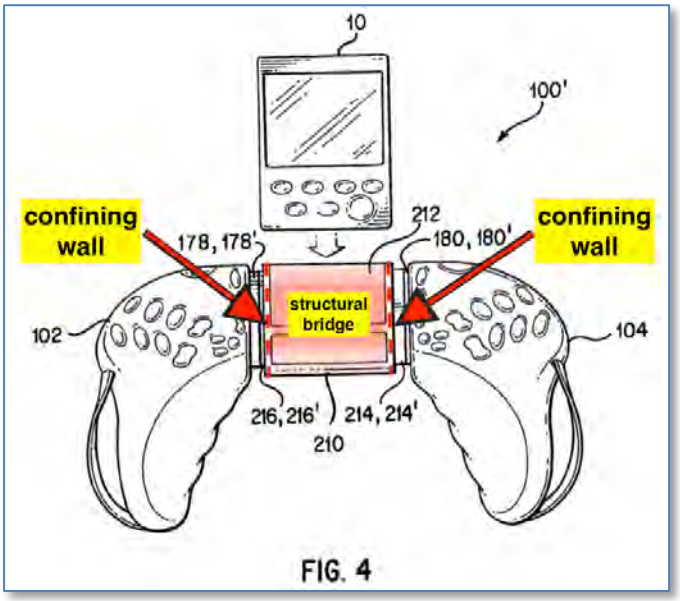
563. Claim 8 would have been obvious for the same reasons explained for claims 4 and 6. As explained above, Willner disclosed a keyboard module as an input device. *see* Willner ¶¶ 25, 10, 27. Additionally, Park taught that a variety of input controls could be used. *see* Park ¶¶19, 20. Finally, as explained above, it would have been obvious to one of ordinary skill in the art to deploy removable input devices on the Willner and Park game control modules. Making the instructional input devices of Willner and Park removable would have simply been an example of applying a known technique to a known device ready for improvement to yield predictable results.

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17. Dependent Claim 9: "The combination of claim 1, in which the structural bridge is a ridged structure."

564. Willner, in combination with Park, discloses a structural bridge which is a ridged structure.

565. As discussed above, Willner discloses a structural bridge in the form of in the form of the support (back) wall of the adaptor 210 which secures the sidewalls (i.e. pair of confinement structures) one to the other, as well as the docked computing device. See Fig. 4 below, annotated to highlight the structural bridge:



Willner Fig. 4 (annotated/highlighted)

566. Willner further discloses that the adaptor 210 has connectors to mate with the housings 102 and 104 as well as a "docking connector… which mates with… the computing device 10"; see Willner ¶51, "Adaptor 210 is provided with complementary **connectors 214′ and 216′** for receiving the keystroke signals from

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each hand grippable unit and transferring such to **a docking connector within the adaptor 210 which mates with a corresponding connector of the computing device 10**." (emphasis added).

567. One of ordinary skill in the art would have understood that the structural bridge of Willner, with the requirement of *physically supporting* housings 102 and 104 through connectors 214' and 216', as well as the computing device 10, through the mating "docking connector," would necessarily be a rigid structure. A POSITA would have understood that attempting to support those devices through connectors mounted to a non-rigid structure would allow the devices to flex the connectors, and consequently the circuit board, potentially compromising the parts' solder joint integrity[67].

568. Park taught that its bridge comprised two sliding portions connected via a series of recessed catching holes and protrusions. Park ¶¶9, 14, 33. A POSITA would have understood such a teaching to require that the bridge be a rigid structure in order to properly function.

569. Therefore, Willner, in combination with Park, renders this claim obvious.

[67] See relevant discussion regarding the importance of a rigid support circuit board (or the use of a rigidizing stiffener for a flexible circuit board) when a board is performing a "mechanical support function." - https://blog.epectec.com/the-purpose-of-a-flex-circuit-stiffener, Appendix W

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18. Dependent Claim 10: "The combination of claim 9, in which the rigid structural bridge is a removable rigid structure."

570. Willner, in combination with Park, discloses the rigid structural bridge as a removable rigid structure.

571. As discussed above, Willner teaches that the rigid structural bridge (i.e. the adaptor 210) is "releasably coupled" to the two housings; *see* Willner Abstract, "One housing (102) is provided with a connecting portion (178, 178′) and the other housing (104) is provided with a connecting portion (180, 180′), the complementary connecting portions allowing the two housings (102 and 104) to be releasably joined together, or **alternately releasably coupled to an adaptor (210)**." (emphasis added).

572. In light of this teaching, it would be obvious that the bridge in the combination of Willner with Park would be a removable rigid structure.

573. Therefore, Willner, in combination with Park, renders this claim obvious.

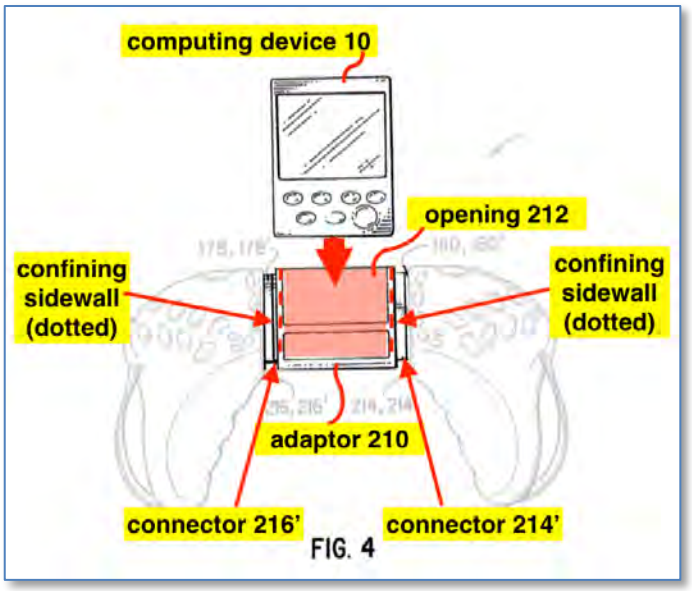
19. Dependent Claim 13: "The combination of claim 1, in which the communication link is a signal pathway."

574. Willner, in combination with Park, discloses a communication link which is a signal pathway.

575. As explained above, Willner discloses a communication link in the form of connectors 214' and 216', "provided with… adaptor 210;" *see* Willner

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¶51, which receive "**the keystroke signals from each hand grippable unit**;" *id.* (emphasis added).



Willner Fig. 4 (annotated/highlighted)

576. Willner further discloses a communication link in the form of wireless communications; *see* Willner ¶30, "Each housing includes an infrared port 148, 150 through which infrared communications is provided with a receiver/interface unit. **The receiver/interface unit is connected to a computing device** to provide the means by which the operation of the control switch groupings 114, 116, 118, and 120 **provide the keystroke and cursor inputs to the computing device**"; *see also* Willner ¶50, "Each of the hand grippable units may communicate with the computing device 10 through a wireless data link, such as by radio frequency, utilizing the '**blue tooth**' standard." (emphasis added).

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577. One of ordinary skill in the art would also understand the wired communication link discussed above to be a signal pathway, as the disclosed electronic connections send the *keystroke signals* to the computing device 10. One of ordinary skill in the art would further understand the wireless communication link to be a signal pathway, as it carries the *keystroke and cursor inputs* (i.e. the keystroke signals) to the computing device 10.

578. Similarly, Park's structural bridge teaches a communication link in the form of a connection cable running inside the bridge that connected the two side controllers; *see* Park ¶36. This too is a signal pathway.

579. In light of these teachings, Willner, in combination with Park, renders this claim obvious.

20. Dependent Claim 14: "The combination of claim 13, in which the signal pathway is a metallic pathway."

580. Willner, in combination with Park, discloses a signal pathway which is a metallic pathway.

581. In the previous claim analysis, I discuss Willner's disclosure of a wired communication link which is a signal pathway. Willner further discusses a hard-wired connection; *see* Willner ¶30, " It should be further understood that the coupling of system 100 with a computing device may also be provided through **hard wire connections**, as is well-known in the art, without departing from the inventive concepts disclosed herein." (emphasis added).

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582. One skilled in the art would understand that a wire is a metallic conductor. Further, a POSITA would know that the use of a metallic pathway, or wire, is a known design option that would be used as expected (to provide a pathway for signals) to produce entirely predictable results (transmission of signals).

583. Therefore, Willner, in combination with Park, renders this claim obvious.

21. Dependent Claim 15: "The combination of claim 13, in which the signal pathway is a fiber optic pathway."

584. Willner, in combination with Park, discloses a signal pathway which is a fiber optic pathway.

585. As discussed above, Willner discloses both wired and wireless signal pathways, using standard wired technologies, as well as wireless infrared technology. Willner clarifies that the disclosure is not limited to any particular technology; *see* Willner ¶30, "Each housing includes an **infrared port** 148, 150 through which infrared communications is provided with a receiver/interface unit. While infrared ports are shown, **it should be understood that other means of wireless communications, such as radio frequency or ultrasonics, may also be utilized**. It should be further understood that the coupling of system 100 with a computing device **may also be provided through hard wire connections**, **as is**

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well-known in the art, without departing from the inventive concepts disclosed herein." (emphasis added).

586. In my opinion, it would have been obvious to one of ordinary skill in the art to consider signal transmission via fiber optic as another option in Willner's open-ended disclosure of communication standards and protocols. Willner discloses the potential use of other "hard wired technologies" that are "well-known in the art, without departing from the inventive concepts disclosed herein." *id*. Consequently, in my opinion, Willner discloses a signal pathway which is a fiber optic pathway.

587. Therefore, Willner, in combination with Park, renders this claim element obvious. The Willner/Park combination would take the form, for example, of a fiber optic cable running through an adjustable bridge

22. Dependent Claim 16: "The combination of claim 1, in which the communication link provides a communication platform."

588. Willner, in combination with Park, discloses a communication link which provides a communication platform.

589. Willner discloses a system which electronically connects the housings 102 and 104, the adaptor 210, and the computing device 10; *see* Willner ¶51, "As previously discussed, housing 102 may be provided with a connector 178′ having a plurality of pins 182 and housing 102 may be provided with a connector 180′

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having a plurality of connector socket connections 184. Adaptor 210 is provided with complementary connectors 214′ and 216′ for receiving the keystroke signals from each hand grippable unit and transferring such to a docking connector within the adaptor 210 which mates with a corresponding connector of the computing device 10."

590. Willner discloses both wired and wireless communication links*; see* Willner ¶30, "Each housing includes an infrared port 148, 150 through which **infrared communications** is provided with a receiver/interface unit. While infrared ports are shown, **it should be understood that other means of wireless communications, such as radio frequency or ultrasonics, may also be utilized**. It should be further understood that the coupling of system 100 with a computing device **may also be provided through hard wire connections**, **as is well-known in the art, without departing from the inventive concepts disclosed herein**." (emphasis added).

591. Park similarly teaches a connection cable running inside the bridge that connected the two side controllers. *see* Park ¶36.

592. In light of these disclosures, a POSITA would have found it obvious for the communication link to provide a communication platform.

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23. Dependent Claim 17: "The combination of claim 16, in which the communication platform is a wired communication module."

593. Willner, in combination with Park, discloses a communication platform which is a wired communication platform.

594. As discussed above in claim 16, Willner discloses a wired communication platform*; see* Willner ¶30, "It should be further understood that the coupling of system 100 with a computing device may also be provided through **hard wire connections**, as is well-known in the art, without departing from the inventive concepts disclosed herein." (emphasis added).

595. Park similarly teaches a connection cable running inside the bridge that connected the two side controllers. *see* Park ¶36.

596. Therefore, Willner, in combination with Park, renders this claim element obvious.

24. Dependent Claim 18: "The combination of claim 16, in which the communication platform is a wireless communication platform."

597. Willner, in combination with Park, discloses a communication platform which is a wireless communication platform.

598. As discussed above in claim 16, Willner discloses a wireless communication platform*; see* Willner ¶30, "While **infrared** ports are shown, **it should be understood that other means of wireless communications, such as**

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radio frequency or ultrasonics, may also be utilized"; *see also* Willner ¶50, "Each of the hand grippable units may communicate with the computing device 10 through a wireless data link, such as by radio frequency, utilizing the '**blue tooth**' standard." (emphasis added).

599. Therefore, Willner, in combination with Park, renders this claim element obvious. The Willner/Park combination would take the form of, for example, the wireless data link, as taught in Willner, implemented in an adjustable bridge, as taught by Park, so that the detachable housings of Willner would be in wireless communication with components comprising the adjustable bridge, which in turn would interact with the computing device and communicate with the detachable housings

25. Dependent Claim 19: "The combination of claim 18, in which the wireless communication platform operates in a frequency range of 2.4 GHz."

600. Willner, in combination with Park, discloses a communication platform which is a wireless communication platform which operates in a frequency range of 2.4 GHz.

601. As discussed above in claim 16, Willner discloses a wireless communication platform*; see* Willner ¶50, "Each of the hand grippable units may communicate with the computing device 10 through a wireless data link, such as by radio frequency, utilizing the '**blue tooth**' standard." (emphasis added).

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602. As one of ordinary skill in the art would have known, *Bluetooth* broadcasts in the 2.4 GHz range*; see* Wired.com[68], "**You live your life at 2.4 GHz**. Your router, your cordless phone, **your Bluetooth earpiece**, your baby monitor and your garage opener all love and live on this radio frequency, and no others." (emphasis added)

603. Therefore, Willner, in combination with Park, renders this claim element obvious.

26. Dependent Claim 20: "The combination of claim 18, in which the wireless communication platform is a personal area network."

604. Willner, in combination with Park, discloses a wireless communication platform which is a personal area network.

605. As discussed above in claim 16, Willner discloses a wireless communication platform*; see* Willner ¶30, "While **infrared** ports are shown, **it should be understood that other means of wireless communications, such as radio frequency or ultrasonics, may also be utilized**"; *see also* Willner ¶50, "Each of the hand grippable units may communicate with the computing device 10 through a wireless data link, such as by radio frequency, utilizing the '**blue tooth**' standard." (emphasis added).

[68] https://www.wired.com/2010/09/wireless-explainer/, Appendix R

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606. A *personal area network,* or PAN, is a computer network organized around an individual person, which is set up for personal use only.[69] Personal area networks are generally used to transmit data between nearby devices, such as computers, phones, printers, game systems, game controllers and tablets. Personal area networks are often deployed with Bluetooth, a wireless technology specifically tailored to short range data transmission, though they can also be connected through a wireless (wifi) network.

607. Willner's wireless communication platform is disclosed as a single person network; in other words, there is no disclosure in Willner of other users having access to the devices connected by the wireless communication link. As Willner also discloses the potential use of Bluetooth for its wireless communication platform, one of ordinary skill in the art would recognize Willner's disclosed wireless communication platform as compatible with the term *personal area network.*

608. Therefore, Willner, in combination with Park, renders this claim element obvious. The Willner/Park combination would take the form of, for example, the wireless data link, as taught in Willner, implemented in an adjustable bridge, as taught by Park, so that the detachable housings of Willner would be in wireless communication with components comprising the adjustable bridge, which

[69] https://www.lifewire.com/definition-of-pan-817889, Appendix S

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in turn would interact with the computing device and communicate with the detachable housings.

27. Dependent Claim 21: "The combination of claim 18, in which the wireless communication platform utilizes infrared technology for data transactions."

609. Willner, in combination with Park, discloses a wireless communication platform which utilizes infrared technology for data transactions.

610. As discussed above in claim 16, Willner discloses a wireless communication platform*; see* Willner ¶30, "Each housing includes **an infrared port** 148, 150 through which infrared communications is provided with a receiver/interface unit." (emphasis added).

611. Therefore, Willner, in combination with Park, renders this claim element obvious.

28. Summary

In summary, based on the above analysis, it is my opinion that Willner, in combination with Park, renders obvious each and every element of the claims 1, 3-10, and 13-21 of the '119 patent.

E. Obviousness Based on Kessler in View of Hirschman

612. The following sections provide an analysis that demonstrates how the combination of Kessler and Hirschman renders the claims 1-3, 5-6, 9-10, and 13-20 obvious. As noted above, a POSITA would have had several reasons to

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combine the teachings of Kessler with Hirschman. Kessler and Hirschman both teach the use of controllers with a computing device (in the same positions) to provide an improved gaming experience for users. Both taught similar control modules with buttons, joysticks, and other input devices and both taught that their controllers enable a user to control applications on the computing device in a manner that is comfortable to hold while avoiding the need to use the touchscreen (which is disruptive to gameplay). *See* Kessler ¶¶2-11, 14-18; Hirschman ¶¶50, 61. Given their similarities and compatible teachings, a POSITA would have been knowledgeable about the teachings of both—including that the teachings of one would be applicable to the other.

613. In addition, a POSITA would have been motivated to improve Kessler's controller device by implementing detachable control modules, as Hirschman teaches. Doing so would have provided the user with the option to choose various control modules for use in gaming or other applications, as Hirschman teaches. Hirschman ¶¶ 61, 67, 82, 84. Hirschman's teachings on this point are exemplary because they were well understood. The use of detachable controls would have been easily recognized for the benefits they provided and would have been implemented into a device like Kessler's with no difficulty. Essentially, one would have retained the sidewalls from Kessler that confine the phone or tablet on each side and made them attachable to the side controllers with

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either a sliding rail or retention posts, as Hirschman teaches. Ultimately, modifying Kessler in this manner would have constituted nothing more than the use of known options (detachable controls with sliding rails for attaching to confining walls) as they were designed to be used to produce predictable results (controls that are detachable).

1. Claim element 1(a): "A combination comprising:

614. Kessler, in combination with Hirschman, is a combination of claimed elements, as described below.

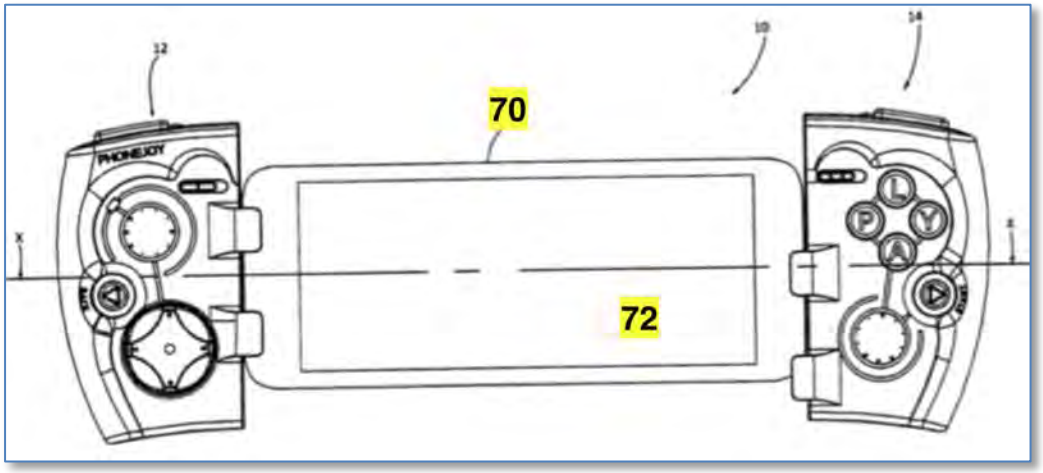
2. Claim element 1(b): "a computing device, the computing device providing a plurality of sides, each of the plurality of sides are disposed between an electronic display screen of the computing device and a back of the computing device;"

615. Kessler discloses a computing device, the computing device providing a plurality of sides, each of the plurality of sides [are] disposed between an electronic display screen of the computing device and a back of the computing device.

616. For instance, Fig. 11 of Kessler discloses a computing device 70, which provides a plurality of sides, each of which are disposed between an electronic display screen 72 and a back of the computing device*; see* Kessler ¶75 "In an open state of the controller apparatus 10 of the invention and as best seen in figures 10 to 12, the left handle housing 12 and the right handle housing 14 can be placed apart by a sufficient amount to define there between a central space 68 for

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receiving a **handheld information processing device 70**"; *also* ¶76 **"… a screen 72 of the handheld information processing device 70** occupies a more natural viewing position for the user relative to the location of the various user input means provided on the handle housings 12, 14." (emphasis added).



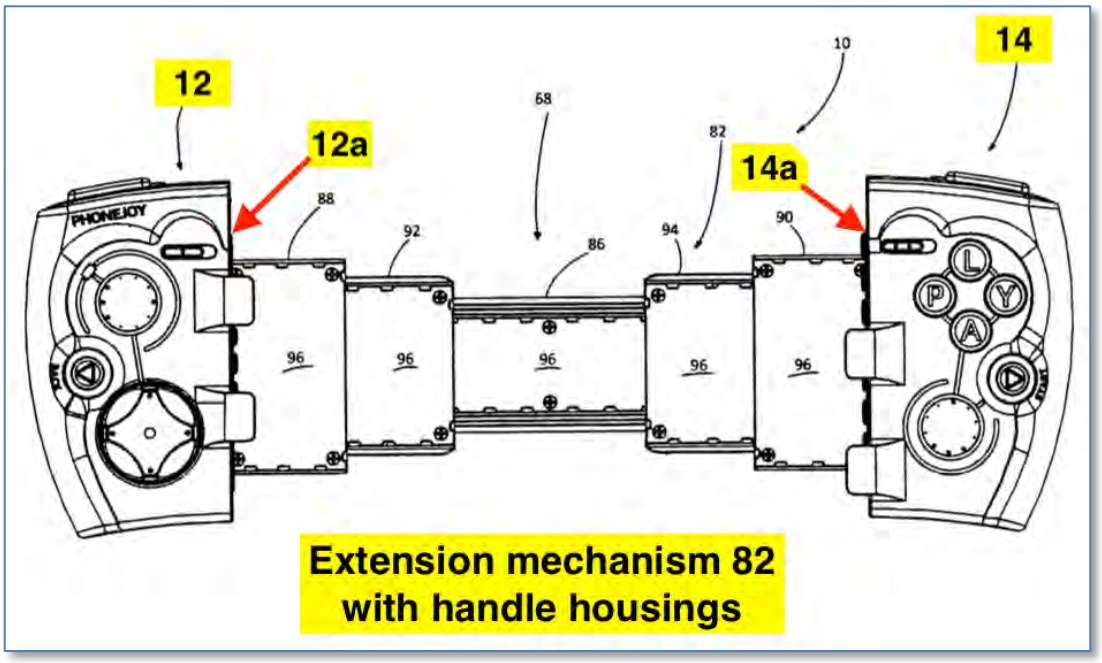
Kessler Fig. 11

3. Claim element 1(c): "a communication port interacting with the computing device, the communication port providing a communication link and a pair of confinement structures, the pair of confinement structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device;"

617. Kessler, in combination with Hirschman, discloses a communication port interacting with the computing device, the communication port providing a communication link and a pair of confinement structures, the pair of confinement structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device.

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618. Kessler discloses a handheld game control system which interacts with the computing device in the form of the extension mechanism 82 attached to the handle housings 12 and 14. The handle housing end faces 12a and 14a contain the computing device.

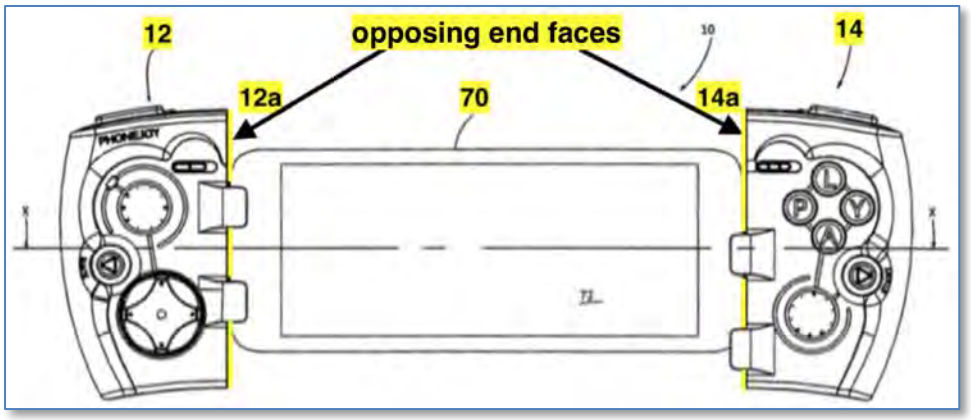


Kessler Fig. 10 (annotated)

619. As shown below, the handle housing end faces 12a and 14a are adjacent to and confine the computing device 70 on at least two opposing sides of the plurality of sides of the computing device*; see* Kessler ¶101, "In a preferred embodiment, the extension mechanism 82 is biased so as to resist movement of the handle housings 12, 14 away from each other and is of a sufficient strength so as to provide a sufficient gripping force for **holding a handheld information**

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processing device 70 between respective opposing end faces 12a, 14a of the handle housings 12, 14." (emphasis added).



Kessler Fig. 11 (annotated)

620. Kessler discloses that, in some embodiments, the input devices, in the form of the left and right handle housing, are physically attached at the bridge*; see* Kessler ¶40, "In accordance with a third main aspect of the invention, there is provided… **an interconnection device for at least physically interconnecting said left handle housing and said right handle housing in a spaced apart relationship to define there between a space for receiving a handheld information processing device**."

621. Kessler further discloses that the interconnection device may also supply electronic communication via the bridge*; see* id. ¶41, "The interconnection device **may be adapted to also electrically connect respective control circuitry provided in said left and right handle housings**."

622. As shown above, Kessler discloses structures which are adjacent to and confine the computing device 70 on at least two opposing sides, in the form of the opposing end faces (side walls) 12a and 14a of the handle housings 12 and 14, which include the input devices. However, the '119 patent requires its input devices "to be a separate and distinct structure from the communication port, forming no structural portion of the communication port"*; see* '119 patent, Claim 1(d)(ii).

623. Therefore, the end face of the handle housings, which incorporate the input devices of Kessler, and which confine the computing device 70, are not (alone) a *confinement structure* under the '119 patent.

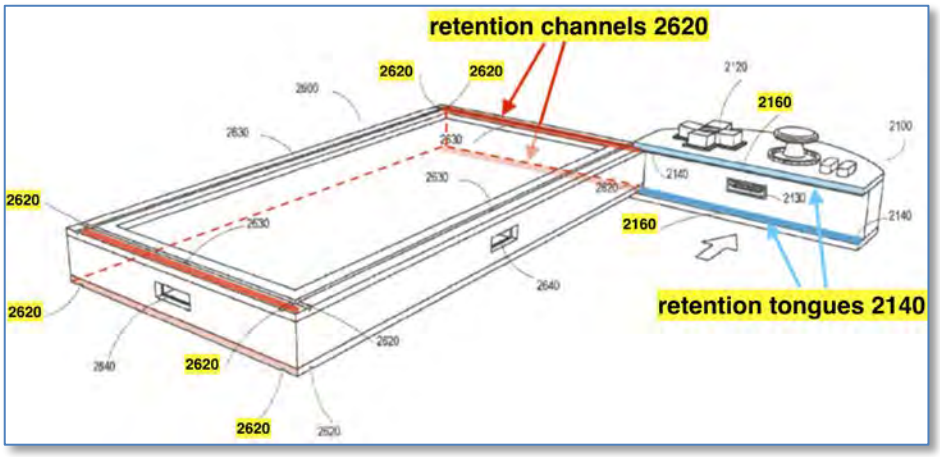
624. The '119 patent discloses confinement structures which are integral to the structure of the communication port in order to facilitate the removal and replacement of control modules. Kessler does not disclose removable control modules. However, Hirschman discloses sidewalls 282, with their attached retention elements 260—teachings that are compatible with and would improve Kessler. One would be motivated to implement these teachings from Hirschman into Kessler by using detachable controls that attach via the mechanisms taught in Hirschman.

625. Hirschman's sidewalls are integral to the structure of the communications port and separate from the input devices, allowing "for the

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portable device to receive a plethora of accessories or peripherals…" *see* Hirschman ¶46*; see* also ¶57, "The chassis 280 may include sidewalls 282, which may contain cutouts in the shape and size to receive retention posts 162 and communications connectors 164…"

626. In addition to the sidewalls, Hirschman also discloses control modules which provide an attachment structure in the form of retention tongues 2140, which interlock with retention channels 2620 on the sidewalls, securing the input device to them.



Hirschman Fig. 20B (modified and annotated)

627. Hirschman discusses at length the advantages of having a system which enables replaceable input devices*; see* Hirschman ¶46, "… allow(s) a user to employ standard accessories that have a matching communications connector in a fashion that they may be presently accustomed to, for example, inserting or attaching a USB standard 'memory stick'…"; *also* ¶82, "Portable computer

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systems can be used for video games and other programs of various types"; also ¶67, "FIG. 6 illustrates a variety of accessories designed to be received by a portable computer system… Accessories may include, but are not limited to… buttons, a joystick, and a d-pad… a folding keyboard."

628. As I discuss in the Background of the Invention section of this report, removable input devices were well known at the time of the '119 patent. In my opinion, given the numerous advantages to the end user of separate and removable input devices, as taught by Hirschman, a POSITA would have been motivated to improve Kessler's controller apparatus by utilizing Hirschman's teachings of detachable controllers that, upon attachment to the sidewalls, or confinement structures, could communicate via a communication link. The confinement structures would be provided by Hirschman's sidewalls (which are similar to Kessler's raised walls), which would in turn connect via Kessler's bridge—which is external to the computing device.

629. One skilled in the art would have been motivated to apply the teachings of Hirschman to Kessler as the change would have had the predictable result of increasing user satisfaction by allowing them to enjoy their system using a greater variety of control devices, versus the two fixed devices proposed by Kessler.

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630. Earlier in my declaration[70] in Section VII, I discuss the fact that the products disclosed in Hirschman and Kessler fall within the same category of products - *associated controller accessories for handheld gaming computing devices*. For this reason, one skilled in the art would have been motivated to apply the teachings of Hirschman to Kessler as it is an example of improving similar devices in the same way. Finally, a POSITA would have been motivated to combine Hirschman and Kessler because adding removable control devices to Kessler would have had the predictable (and desirable) result of increasing player satisfaction.

631. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

4. Claim element 1(d)(i): "an input device attached to and in electronic communication with the communication port;"

632. Kessler, in combination with Hirschman, discloses an input device attached to and in electronic communication with the communication port.

633. Kessler discloses an input device in the form of the user input means provided on the left and right handle housings 12 and 14*; see* Kessler ¶73, "In the preferred embodiment as shown in the drawings, **each of the left and right handle housings 12, 14 is provided with a number of user input means**. The **user input**

[70] See Section VII.

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means may comprise any one or a combination of a direction pad 'D pad', a joy stick, and one or more push buttons." (emphasis added).

634. The user input means generate control signals which are communicated to the computing device 70*; see* Kessler ¶79, "…each of the handle housings 12, 14 is provided with respective control circuitry 72, 74 to respectively process user control and/or other inputs entered by a user at such handle housings 12, 14 **in order to generate control signals to be communicated to the handheld information processing device 70** received in the defined space 68." (emphasis added).

635. Kessler discloses that the input devices, in the form of the left and right handle housing, are physically attached at the structural bridge (interconnection device)*; see* Kessler ¶40, "In accordance with a third main aspect of the invention, there is provided… **an interconnection device for at least physically interconnecting said left handle housing and said right handle housing in a spaced apart relationship to define there between a space for receiving a handheld information processing device**."

636. Kessler further discloses that the interconnection device may also supply electronic communication with the communication port*; see id.* ¶41, "The interconnection device **may be adapted to also electrically connect respective control circuitry provided in said left and right handle housings**."

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637. Therefore, Kessler discloses an input device attached to and in electronic communication with the structural bridge/interconnection device.

638. While Kessler does not disclose a communication port which enables the removal of the input device, as I discuss above in reference to claim element 1(c), it would have been obvious for one of skill in the art to incorporate the communication port and attachment mechanism of Hirschman into Kessler's handheld control apparatus, allowing for removable and replaceable input devices. In the combination of Kessler with Hirschman, the input device would be both attached to and in electrical connection with the communication port, as explicitly taught in Hirschman.

639. Given the numerous advantages to the end user of removable and replaceable input devices, as taught by Hirschman, this change would have had the predictable result of increasing user satisfaction by allowing them to enjoy their system using a greater variety of control devices, versus the two fixed devices proposed by Kessler. As discussed in Section VII above, it would have been obvious to implement this feature in Kessler's handheld control system as it is an example of improving similar devices in the same way. Finally, a POSITA would have been motivated to combine Hirschman and Kessler, as adding removable control devices to Kessler would have had the predictable result of increasing player satisfaction.

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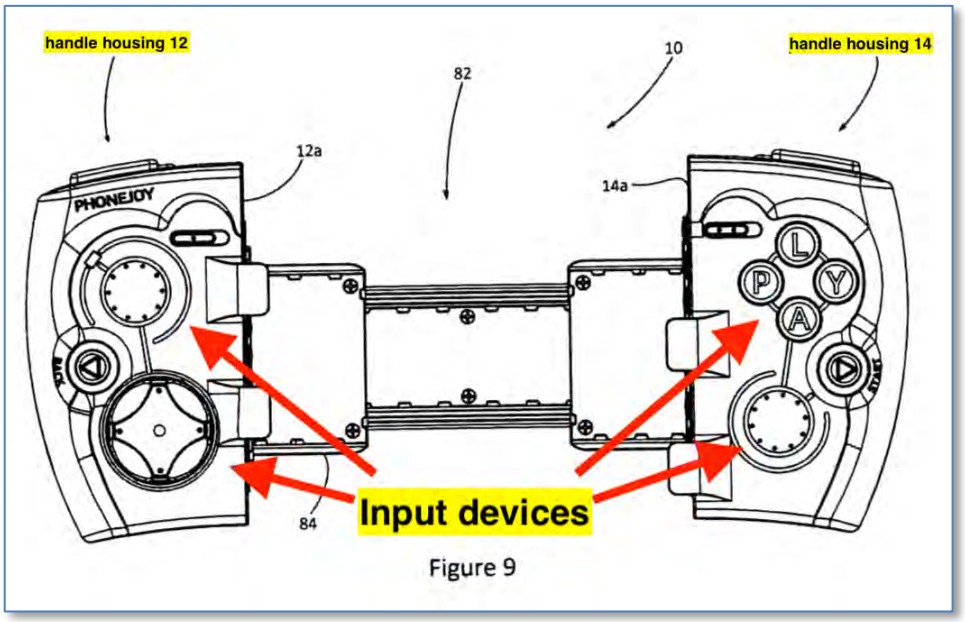
640. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

5. Claim element 1(d)(ii): "the input device providing a pair of control modules, the pair of control modules providing input module apertures, each input module aperture secures an instructional input device, wherein said input module apertures are adjacent each of the at least two opposing sides of the plurality of sides of the computing device, and wherein the input device is a separate and distinct structure from the communication port, forming no structural portion of the communication port; and"

641. Kessler, in combination with Hirschman, discloses an input device providing a pair of control modules, the pair of control modules providing input module apertures, each input module aperture secures an instructional input device, wherein said input module apertures are adjacent each of the at least two opposing sides of the plurality of sides of the computing device, and wherein the input device is a separate and distinct structure from the communication port, forming no structural portion of the communication port.

642. As discussed, Kessler discloses an input device comprised of two control modules in the form of left and right handle housings 12 and 14, each of which secure an instructional input device. For example, Fig. 9 of Kessler shows left and right handle housings 12 and 14, which include common input devices such as buttons, a joystick and a d-pad.

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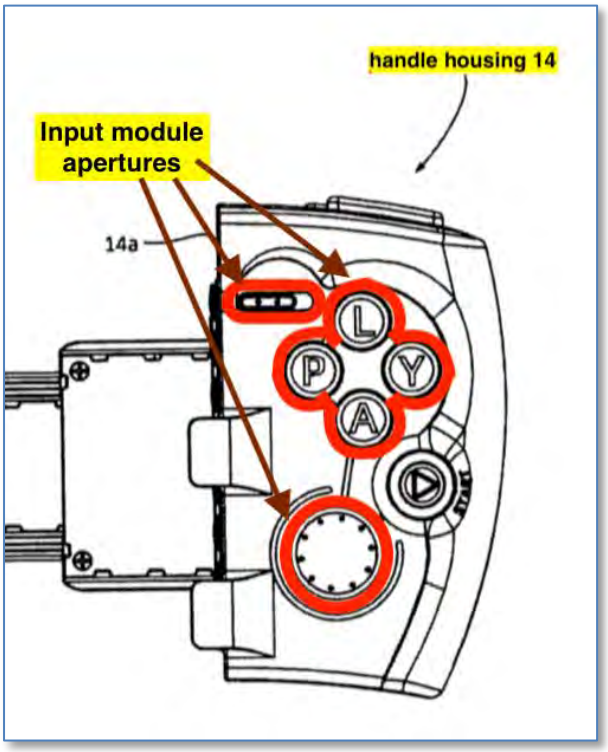
Kessler Fig. 9 (annotated)

643. Kessler further discloses the fact that the left and right handle housings 12 and 14 secure instructional input devices*; see* Kessler ¶74, "…the left handle housing 12 is provided with a D pad 30, a 'BACK' push button 32, an analog joy stick 34, a power on/off switch 36, a power on/off LED 38, first and second 'LEFT' push buttons 40, 42, a charging LED 44 and an analog on/off LED 46. The right handle housing 14 is provided with an analog joy stick 48, a 'START' push button 50, an analog on/off switch 52, four action pushbuttons 'P' 54, 'L' 56, 'A' 58 and 'Y' 60, first and second 'RIGHT' push buttons 62, 64…"

644. As one of skill in the art would understand, these types of instructional input devices (buttons, joysticks, etc.) feed through an opening (i.e. aperture) in the plastic casing of the game accessory module. Each of the handle housings provides these input module apertures, which secure an instructional

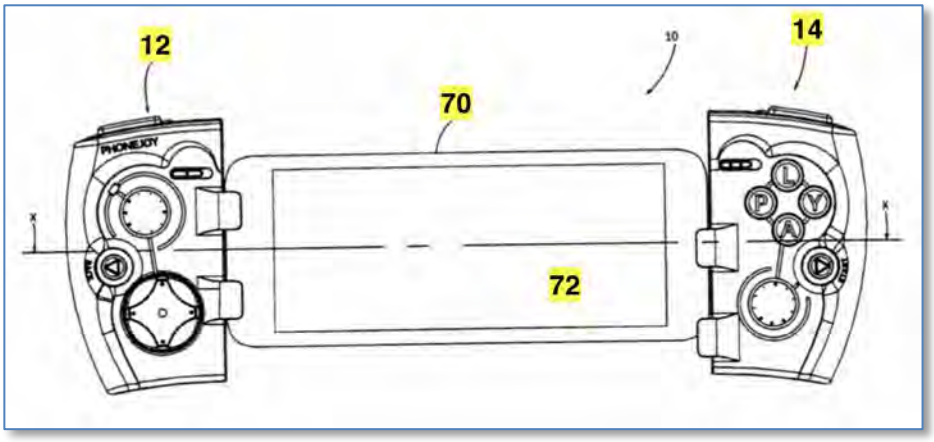
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input device. The closeup below, taken from Fig. 9, highlights the input module apertures associated with input devices of Kessler:



Kessler Fig. 9 closeup (annotated)

645. Fig. 11 of Kessler shows the handle housings 12 and 14, with input module apertures, adjacent to at least two opposing sides of the plurality of sides of the computing device 70:



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Kessler Fig. 11 (annotated)

646. While Kessler does not disclose an input device wherein the input device is a separate and distinct structure from the communication port, forming no structural portion of the communication port, as I discuss above in reference to claim element 1(c), it would have been obvious for one of skill in the art to incorporate the communication port and attachment mechanism of Hirschman into Kessler's handheld control apparatus, allowing for an input device which is a separate and distinct structure from the communication port, and thus removable and replaceable.

647. Given the numerous advantages to the end user of removable and replaceable input devices, as taught by Hirschman, this change would have had the predictable result of increasing user satisfaction by allowing them to enjoy their system using a greater variety of control devices, versus the two fixed devices proposed by Kessler. As I discuss in Section VII above, it would have been obvious to implement this feature in Kessler's handheld control system as it is an example of improving similar devices in the same way. Finally, a POSITA would have been motivated to combine Hirschman and Kessler, as adding removable control devices to Kessler would have had the predictable result of increasing player satisfaction.

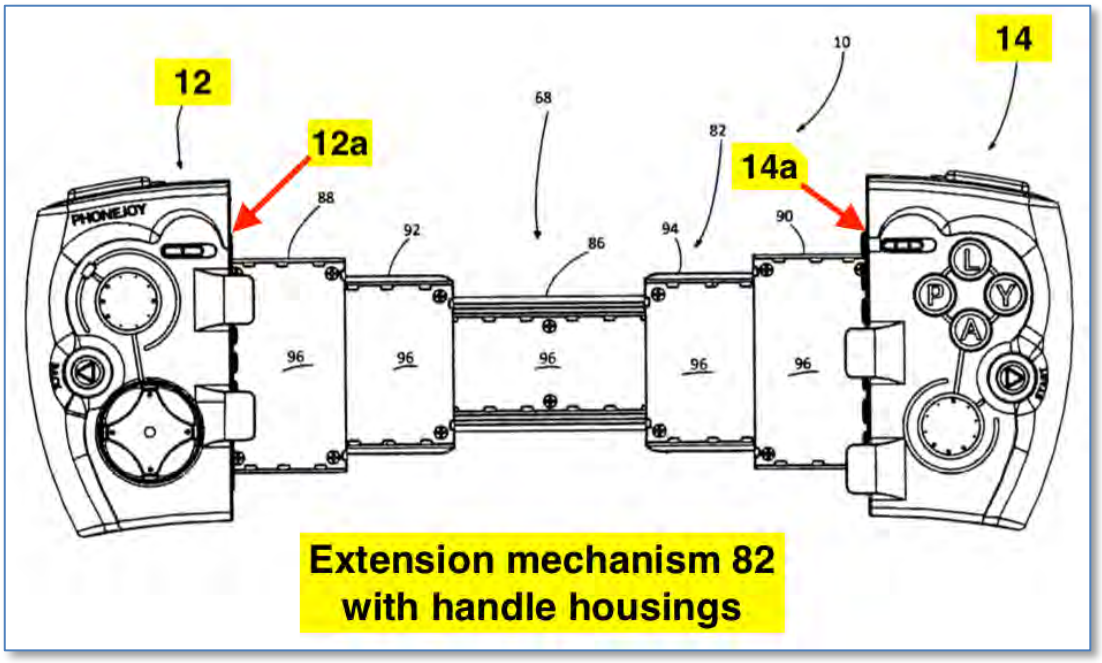
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648. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

6. Claim element 1(e)(i): "a structural bridge securing the pair of confinement structures one to the other,"

649. Kessler, in combination with Hirschman, discloses a structural bridge securing the pair of confinement structures on to the other.

650. Kessler discloses a structural bridge in the form of the extension mechanism 82, which secures the handle housings 12 and 14 one to the other. *See* Kessler Fig. 10 below:



Kessler Fig. 10 (annotated)

651. While the handle housings of Kessler are not (alone) confinement structures as taught by the '119 patent (even though they confine the computing device), as I discuss above in reference to claim element 1(c), a POSITA would

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have been motivated to incorporate the teachings of Hirschman into Kessler's handheld control apparatus, in order to allow for removable and replaceable input devices. Implementing that teaching would include keeping sidewalls that serve as confinement structures (as taught in Hirschman), as well as including detachable control modules that attach via either retention posts or sliding rails to those sidewalls, as also taught in Hirschman.

652. Given the numerous advantages to the end user of removable and replaceable input devices, as taught by Hirschman, this change would have had the predictable result of increasing user satisfaction by allowing them to enjoy their system using a greater variety of control devices, versus the two fixed devices proposed by Kessler. As I discuss in Section VII above, it would have been obvious to implement this feature in Kessler's handheld control system as it is an example of improving similar devices in the same way. Finally, a POSITA would have been motivated to combine Hirschman and Kessler, as adding removable control devices to Kessler would have had the predictable result of increasing player satisfaction.

653. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

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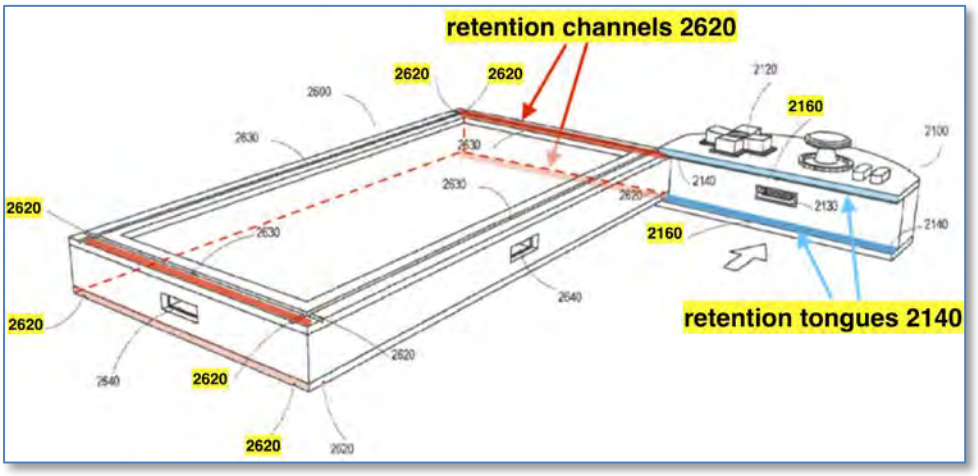
7. Claim element 1(e)(ii): "in which each of the pair of control modules provide an attachment structure cooperating with the communication port, each attachment structure secures the input device to the communication port,"

654. Kessler, in combination with Hirschman, discloses a pair of control modules which provide an attachment structure cooperating with the communication port, each attachment structure securing the input device to the communication port.

655. As discussed above, Kessler discloses a pair of control modules in the form of handle housings 12 and 14. The handle housings are attached to the extension mechanism 82*; see* Kessler ¶83, "In order to facilitate the variable space apart of the left and right handle housings 12, 14, the handle housings 12, 14 are physically interconnected by an extension mechanism 82."

656. Kessler does not disclose control modules which provide an attachment structure which cooperates with the communication port to secure the input device to the communication port. However, Hirschman discloses control modules which provide an attachment structure in the form of retention tongues 2140, which interlock with retention channels 2620 on the communication port, securing the input device to the communication port. See a modified version of Fig. 20B of Hirschman:

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Hirschman Fig. 20B (modified and annotated)

657. As I discuss above in reference to claim element 1(c), it would have been obvious for one of skill in the art to incorporate the attachment structures of Hirschman, in combination with the confinement structures of Hirschman, into Kessler's handheld control apparatus, in order to allow for removable and replaceable input devices.

658. Given the numerous advantages to the end user of removable and replaceable input devices, as taught by Hirschman, this change would have had the predictable result of increasing user satisfaction by allowing them to enjoy their system using a greater variety of control devices, versus the two fixed devices proposed by Kessler. As I discuss in Section VII above, it would have been obvious to implement this feature in Kessler's handheld control system as it is an example of improving similar devices in the same way. Finally, a POSITA would have been motivated to combine Hirschman and Kessler, as adding removable

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control devices to Kessler would have had the predictable result of increasing player satisfaction.

659. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

8. Claim element 1(f)(i): "and in which the structural bridge comprising: a conduit between the pair of control modules;"

660. Kessler, in combination with Hirschman, discloses a structure bridge which comprises a conduit between the pair of control modules.

661. Kessler discloses a structural bridge in the form of the extension mechanism 82, which includes an electrical connection means 112 which connects the control housings, in the form of handle housings 12 and 14*; see* Kessler ¶92, "The respective control circuitries 72, 74 of the handle housings 12, 14 are **electrically connected by an electrical connection means 112**. The electrical connection means 112 is preferably arranged to **pass through the interior of the extension mechanism 82**." (emphasis added).

662. Kessler (¶93) goes on to state, "Using the extension mechanism 82 as a form of conduit for the electrical connection means 112 not only provides some protection for said electrical connection means 112, but also saves space." In light of this teaching, a POSITA would understand that it would be obvious to include a conduit as properly construed in the combination of Kessler with Hirschman.

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663. One of skill in the art would understand that a wire being run through a mechanically-active environment, such as the inside of a sliding, retracting and expanding bridge, would necessarily be run through a conduit to physically protect the integrity of the wire. Consequently, it would have been obvious to one of skill in the art to run a conduit through the structural bridge of Kessler to connect the first and second control modules together with a physical wire.

664. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

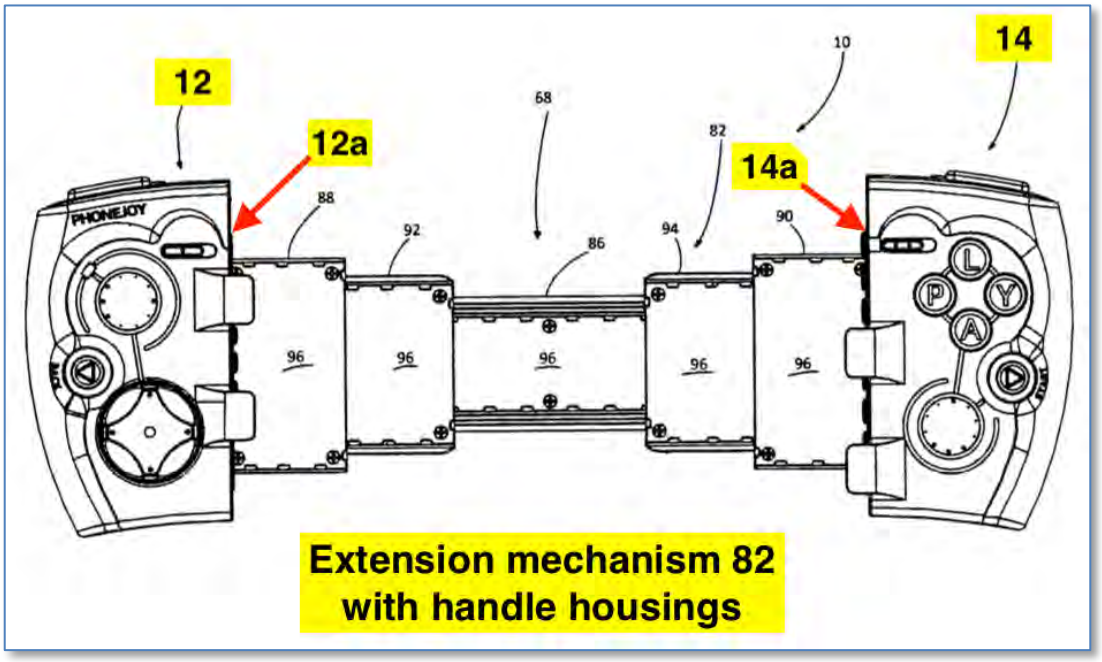
9. Claim element 1(f)(ii): "[the structural bridge comprising:] and a fastening mechanism cooperating with the pair of confinement structures, the fastening mechanism secures the pair of confinement structures one to the other."

665. Kessler, in combination with Hirschman, satisfies this limitation.

666. As explained above, a POSITA would have found it obvious to include a fastening mechanism for purposes of securing the pair of confinement structures one to the other. Kessler discloses a structural bridge in the form of the extension mechanism 82. As already explained, Kessler's extension mechanism, or bridge, contained slats that slide together via overlapping tongue/groove connections. Kessler ¶¶90-91. While Kessler is not necessarily explicit on how its extension mechanism was fastened together, a POSITA would have understood that it would be obvious to fasten them together through the use of a latch or structure such as that used in Park.

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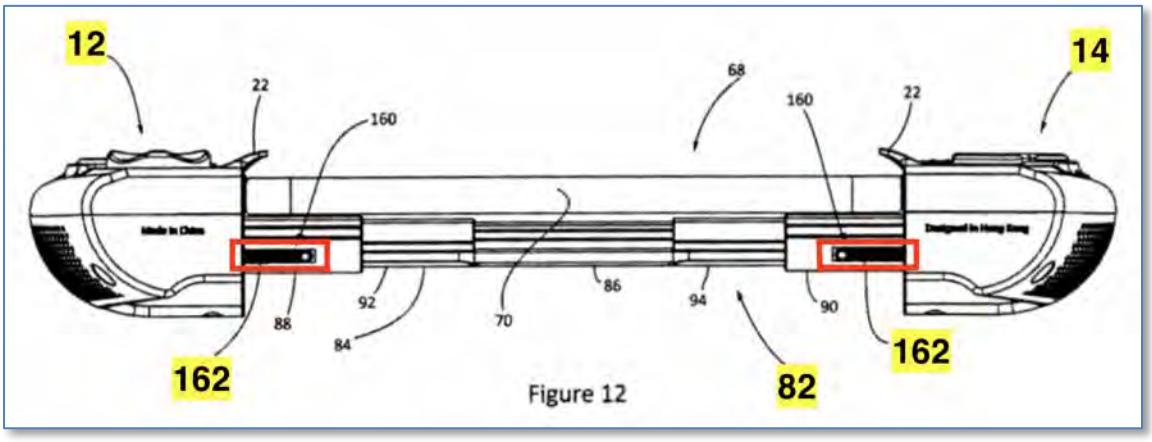
667. Under Gamevice's apparently proposed constructions, Kessler's tongue and groove connections explicitly satisfied this limitation. As shown below, the bridge connects the two side housings. See Kessler Fig. 10 below:



Kessler Fig. 10 (annotated)

668. Kessler discloses coil springs 162 in the extension mechanism where the extension mechanism meets the housings*; see* Kessler ¶99, "… there are provided respective pairs of biasing means 160 (figure 12) in the form of **coil springs 162 attached between the handle housings 12, 14 and respective ones of the primary sections 88, 90 of the slide mechanism 84**…" (emphasis added). See Kessler Fig. 12 below:

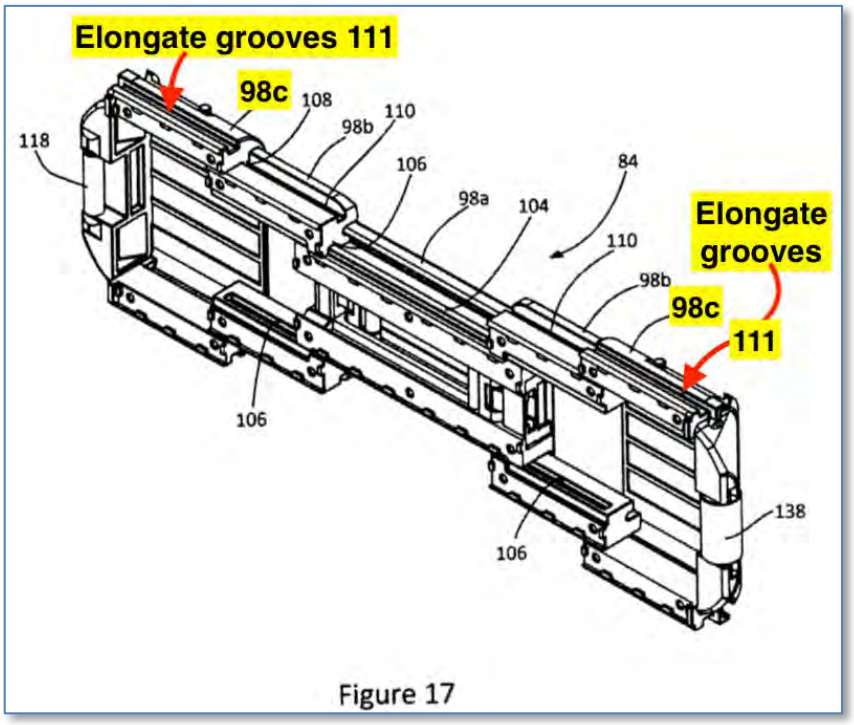
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Kessler Fig. 12 (annotated)

669. Kessler additionally discloses that the primary slide members 98c, which are part of the extension mechanism 82, are fastened to the handle housings 12 and 14 through a tongue and groove connection, facilitated by grooves 111*; see* Kessler ¶91, "…each of the primary slide members 98c forms a tongue and groove connection with its respective one of the handle housings 12, 14. As can be seen in figure 17, each of the primary slide members 98c has elongate groves 111 formed in its outermost facing walls which, in use, engage complementary tongue structures formed within the respective handle housings 12, 14…" See Figure 17 below:

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Kessler Fig, 17 (annotated)

670. Therefore, Kessler discloses the fastening mechanism element under Gamevice's overbroad construction in the form of the primary slide members 98c interacting with the elongate grooves 111. Kessler's structure is a fastening mechanism as Patent Owner appears to construe that term. At a minimum, as explained above, it would have been obvious to use a structure equivalent to the latch disclosed in the ’119, as taught in Park, for example. There are a limited number of structures that can be used to fasten two components together, so the selection of one over the other is not a novel idea and, in the case of the '119 patent, serves no particular purpose.

671. Kessler does not disclose confinement structures as defined in the ’119 patent. However, as I discuss above in reference to claim element 1(c), it

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would have been obvious for one of skill in the art to incorporate the use of sidewalls as confinement structures, in combination with the attachment structures of Hirschman, into Kessler's handheld control apparatus, in order to allow for removable and replaceable input devices.

672. Given the numerous advantages to the end user of removable and replaceable input devices, as taught by Hirschman, this change would have had the predictable result of increasing user satisfaction by allowing them to enjoy their system using a greater variety of control devices, versus the two fixed devices proposed by Kessler. As I discuss in Section VII above, it would have been obvious to implement this feature in Kessler's handheld control system as it is an example of improving similar devices in the same way. Finally, a POSITA would have been motivated to combine Hirschman and Kessler, as adding removable control devices to Kessler would have had the predictable result of increasing player satisfaction.

673. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

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10. Dependent Claim 2: "The combination of claim 1, further comprising a data storage device confined within the input device and communicating with the computing device."

674. Kessler, in combination with Hirschman, discloses a data storage device confined within the input device and communicating with the computing device.

675. As discussed above in my claim 1 analysis, Kessler discloses input devices in the form of the handle housings 12 and 14. Kessler also discloses a computing device in the form of the handheld information processing device 70.

676. Kessler further discloses a memory device within the handle housing which communicates with the computing device 70*; see* Kessler ¶79, "**Each of the handle housings 12, 14** is provided with respective control circuitry 72, 74 (figure 19), the circuitries 72, 74 being contained within their respective handle housings 12, 14 and preferably comprising suitable components mounted on a circuit board. Each of said circuitries 72, 74 comprises **a memory 76 storing machine readable instructions**, a processor 78 for executing said machine readable instructions in order to generate control signals for said handheld information processing device 70 received in the defined space 68, **and a communication module 80 for communicating any control signals generated by the processor 78 to said handheld information processing device 70**."

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677. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

11. Dependent Claim 3: "The combination of claim 1, further comprising an auxiliary power source confined within the input device and communicating with the computing device."

678. Kessler, in combination with Hirschman, discloses an auxiliary power source confined within the input device and communicating with the computing device.

679. As discussed above in my claim 1 analysis, Kessler discloses a computing device in the form of the handheld information processing device 70. Kessler also discloses input devices in the form of the handle housings 12 and 14 which communicate with the computing device.

680. Kessler further discloses an auxiliary power source within the handle housing*; see* Kessler ¶93, "In the preferred embodiment as shown in the drawings, the electrical connection means 112 comprises a flexible circuit 114 for enabling the respective control circuitries 72, 74 of the handle housings 12, 14 to communicate with each other **and for power to be passed from a power supply provided in one of the handle housings** to the circuitry provided in the other handle housing." Similarly, Hirschman teaches the use of a battery in the computing device or in the handle controllers and transmitting power between the controllers and the computing device. Hirschman ¶¶56, 59. Additionally, this

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claim recites nothing more than using known components (power sources) as intended to achieve predictable results (powering or charging a device).

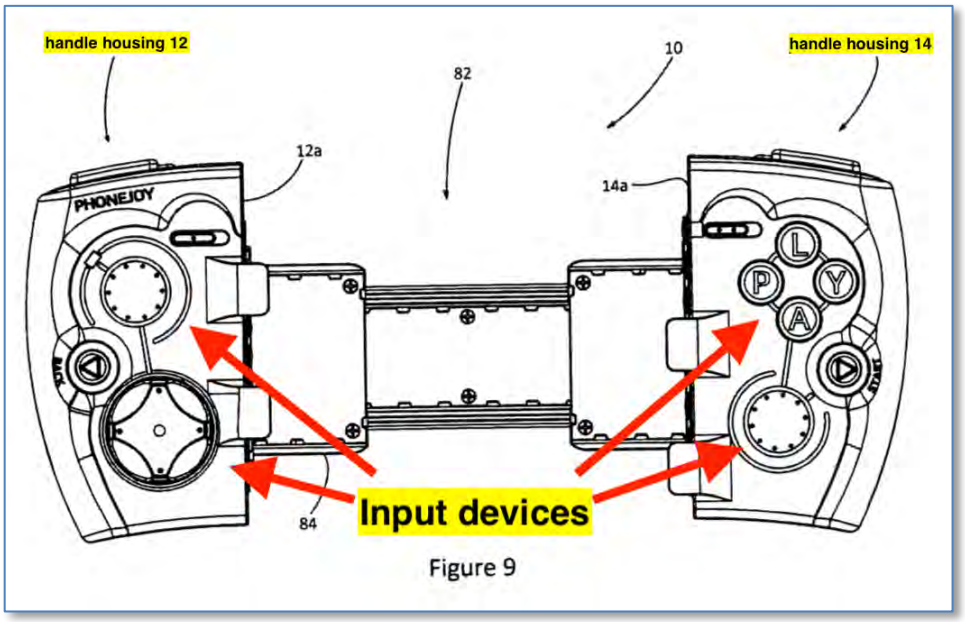
681. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

12. Dependent Claim 5: "The combination of claim 1, in which the instructional input device is a game control module, and in which the game control module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

682. Kessler, in combination with Hirschman, discloses an instructional input device which is a game control module, and in which the game control module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device.

683. As discussed, Kessler discloses a game module comprised of two control modules in the form of left and right handle housings 12 and 14, each of which secures an instructional input device. For example, Fig. 9 of Kessler shows left and right handle housings 12 and 14, which include common video game input devices such as buttons, a joystick and a d-pad.

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Kessler Fig. 9 (annotated)

684. One of ordinary skill in the art would have recognized the controls shown above as game control modules, as they are specifically provided for controlling gaming applications.

685. Kessler discloses that the game control module passes signals through the communication port to the computing device. See my analysis for claim element 1(d)(i) in Section X.E.4 regarding "an input device attached to and in electronic communication with the communication port."

686. Kessler further discloses that the signals from the game control modules control images displayed on the display screen of the computing device; *see* Kessler ¶93, "The game pad apparatus 10 contains control circuitry and a communications module whereby the game pad apparatus 10 can generate control signals and communicate these via a short range wireless protocol to the smart

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phone 70 **in order to exert some control on a game or other application running on the smart phone 70**." (emphasis added).

687. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

13. Dependent Claim 6: "The combination of claim 1, in which the instructional input device is a keyboard module, and in which the keyboard module passes signals through the communication port to the computing device, the signals controlling images displayed on the display screen of the computing device."

688. Kessler, in combination with Hirschman, satisfies this claim. As discussed above in my analysis of dependent claim 5, Kessler discloses an instructional input device which passes signals through the communication port to the computing device, with those signals controlling images displayed on the display screen of the computing device.

689. Kessler and Hirschman both disclose that a variety of controls can be used. For example, one of skill in the art would have understood that Kessler's disclosure was not limited to the specific input devices described in the specification*; see* Kessler ¶73, "In the preferred embodiment as shown in the drawings, each of the left and right handle housings 12, 14 is provided with **a number of user input means. The user input means may comprise** any one or a combination of a direction pad 'D pad', a joy stick, and **one or more push buttons.**" (emphasis added). In fact, the disclosure "**one or more push buttons**"

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can be interpreted to cover a keyboard module, which is comprised of "one or more" push buttons.

690. Kessler further confirms the embodiments as described "do not limit the scope of the invention in any manner" and "variations of the invention… can be made without departing from the spirit and scope thereof"*; see* Kessler ¶108. In my opinion, one of skill in the art would understand a keyboard module to be a reasonable variation for an input device, and not departing from the spirit and scope of the invention.

691. Kessler discusses the need for accommodating more advanced games on mobile devices, including **PC games** (which are generally played with a keyboard)*; see* Kessler ¶2, "Handheld information processing devices such as mobile phones, smart phones, personal digital assistants, e-readers and even tablet computers are increasingly being used for… playing games of the type here to before adapted for playing on dedicated games consoles. Many of these handheld devices… are becoming as powerful from an information processing perspective as dedicated game consoles **or even personal computers 'PCs'**." (emphasis added)

692. In my opinion, based on the above, it would have been obvious to one of ordinary skill in the art to include a keyboard module as an instructional input device in Kessler.

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693. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

14. Dependent Claim 9: "The combination of claim 1, in which the structural bridge is a ridged structure."

694. Kessler, in combination with Hirschman, discloses a structural bridge which is a ridged structure.

695. As discussed above, Kessler discloses a structural bridge in the form of extension mechanism 82. The extension mechanism 82 includes the slide mechanism 84*; see* Kessler ¶85, "Referring to figures 8 through to 20 and more particularly to figures 13 to 18, **it can be seen that the extension mechanism 82 comprises a telescoping slide mechanism 84**." (emphasis added).

696. Kessler discloses that the slide mechanism 84 is rigid*; see* Kessler ¶89, "Each section of the **slide mechanism 84 comprises a section of generally rectangular cross-section which greatly enhances the strength and rigidity** of the mechanism 84…" Kessler further taught that its bridge comprised slide sections of molded plastics and a sheet metal cover plate, which provided a rigid structure as the structural bridge. Kessler ¶89. Consequently, Kessler discloses a structural bridge which is a ridged structure.

697. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

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15. Dependent Claim 10: "The combination of claim 9, in which the rigid structural bridge is a removable rigid structure."

698. Kessler, in combination with Hirschman, discloses the rigid structural bridge as a removable rigid structure.

699. As explained above, I discuss how one of skill in the art would be motivated to combine Hirschman's detachable controllers with Kessler's controller. This combination of Kessler and Hirschman would disclose the rigid structural bridge of Kessler (see claim 9 analysis above), combined with the sidewalls and detachable controllers of Hirschman, allowing for the removal of input devices from the structural bridge. Therefore, the combination of Kessler and Hirschman discloses a rigid structural bridge which is a removable rigid structure.

16. Dependent Claim 13: "The combination of claim 1, in which the communication link is a signal pathway."

700. Kessler, in combination with Hirschman, discloses a communication link which is a signal pathway.

701. In my analysis in regards to claim element 1(c), which can be found in Section X.E.3, I discuss Kessler's disclosure of a communication link provided by the communication port. The communication link disclosed is an electrical connection between the communication port and the left and right handle housings*;* *see* Kessler ¶41, "The interconnection device may be adapted **to also electrically connect** respective control circuitry provided in said left and right handle

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housings." One of ordinary skill in the art would understand this communication link to be a signal pathway, which carries at least the controls signals generated by the left and right handle housings. Hirschman similarly taught a physical electrical connection between side handle controllers and the computer via USB or other ports, which provide a signal pathway.

702. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

17. Dependent Claim 14: "The combination of claim 13, in which the signal pathway is a metallic pathway."

703. Kessler, in combination with Hirschman, discloses a signal pathway which is a metallic pathway.

704. In the previous claim analysis, I discuss Kessler's disclosure of a communication link which is a signal pathway. In my analysis for claim element 1(c), which can be found in Section X.E.3, I discuss Kessler's disclosure of the communication link as a physical interconnection*; see* Kessler ¶40. One skilled in the art would understand that a short distance physical connection, which is also an electrical connection, would by definition be facilitated by a metallic conductor, such as a wire.

705. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

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18. Dependent Claim 15: "The combination of claim 13, in which the signal pathway is a fiber optic pathway."

706. Kessler, in combination with Hirschman, discloses a signal pathway which is a fiber optic pathway.

707. Kessler taught that the electrical connection means could be a multi-wire electrical connector or "any suitable electrical power and signal connection means." Kessler ¶93. Hirschman discloses signal pathways based on "a number of well-known communications standards and protocols"*; see* Hirschman ¶52, "In one embodiment of the present invention communications port 124 may be a USB 2.0 port, but could alternatively be any of a number of well-known standards and protocols such as, e.g., parallel, SCSI (small communications system interface), Firewire (IEEE 1394), Ethernet, HDMI, etc."

708. In my opinion, it would have been obvious to one of ordinary skill in the art to include transmission via fiber optic as an option covered by Kessler's and Hirschman's open ended disclosure of communication methods, standards, and protocols. Consequently, in my opinion, the combination of Kessler with Hirschman discloses a signal pathway which is a fiber optic pathway.

709. Additionally, in my opinion, it would have been obvious to one of ordinary skill in the art to apply the teachings of Hirschman to Kessler. As I discuss in Section VII above, Hirschman and Kessler fall within the same category of devices - *associated controller accessories for handheld gaming computing*

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devices. Therefore, applying a communications technology from Hirschman to Kessler would be an example of improving similar devices in the same way. Also, given the similarities between the two inventions, one of ordinary skill in the art would be motivated to apply Hirschman's teachings regarding the use of other communications standards and protocols to Kessler as it would be low risk and would be likely to yield predictable results.

710. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious. The Kessler/Hirschman combination would take the form, for example, of a fiber optic cable running through an adjustable bridge.

19. Dependent Claim 16: "The combination of claim 1, in which the communication link provides a communication platform."

711. Kessler, in combination with Hirschman, discloses a communication link which provides a communication platform.

712. In my analysis in regards to claim element 1(c), which can be found in Section X.E.3, I discuss Kessler's disclosure of a communication link provided by the communication port. The communication link disclosed is an electrical connection between the communication port and the left and right handle housings*; see* Kessler ¶41, "The interconnection device may be adapted **to also electrically connect** respective control circuitry provided in said left and right handle

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housings." One of ordinary skill in the art would understand that this input device circuit must necessarily be connected to the smart device for the system to work.

713. As a result, Kessler discloses a communication link which provides a communication platform, connecting signals between the left and right housings and the computing device.

714. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

20. Dependent Claim 17: "The combination of claim 16, in which the communication platform is a wired communication module."

715. Kessler, in combination with Hirschman, discloses a communication platform which is a wired communication platform.

716. In my analysis in regards to claim element 1(c), which can be found in Section X.E.3, I discuss Kessler's disclosure of a communication link provided by the communication port. As the two handle housings are physically attached, the communication link disclosed is a **wired** electrical connection between the communication port and the left and right handle housings*; see* Kessler ¶41, "The interconnection device may be adapted **to also electrically connect** respective control circuitry provided in said left and right handle housings."

717. As a result, Kessler discloses a communication platform which is a wired communication platform.

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718. Therefore, Kessler, in combination with Hirschman, renders this claim element obvious.

21. Dependent Claim 18: "The combination of claim 16, in which the communication platform is a wireless communication platform."

719. Kessler, in combination with Hirschman, renders this claim obvious.

720. Kessler discloses a wireless connection between the circuitry in the left and right handle housings and the computing device, creating a wireless communication platform*; see* Kessler ¶80, "The communication modules 80 are adapted to communicate control and/or other signals to the information processing device 70 using a short range wireless communication protocol such as Bluetooth? or WiFi?" In light of this disclosure, a POSITA would have found it obvious for the communication platform to be a wireless communication platform in the combined Kessler/Hirschman device. The Kessler/Hirschman combination would take the form of, for example, the communications module, as taught in Kessler, implemented in an adjustable bridge with side walls for detachable control modules, as taught by the Kessler/Hirschman combination, so that the handle housings of Kessler would wirelessly communicate with the adjustable bridge, which in turn would communicate with the computing device.

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22. Dependent Claim 19: "The combination of claim 18, in which the wireless communication platform operates in a frequency range of 2.4 GHz."

721. Kessler, in combination with Hirschman, renders this claim obvious.

722. Kessler discloses a wireless connection between the circuitry in the left and right handle housings and the computing device, creating a wireless communication platform*; see* Kessler ¶80, "The communication modules 80 are adapted to communicate control and/or other signals to the information processing device 70 using a short range wireless communication protocol such as Bluetooth? or WiFi?"

723. As one of ordinary skill in the art would know, the Bluetooth and Wifi wireless technologies both broadcast in the 2.4 GHz range*; see* RadioElectronics.com[71], "There is a total of fourteen channels defined for use by **Wi-Fi 802.11 for the 2.4 GHz** ISM band"*; see* also Wired.com[72], "**You live your life at 2.4 GHz**. **Your router**, your cordless phone, **your Bluetooth earpiece**, your baby monitor and your garage opener all love and live on this radio frequency, and no others." (emphasis added).

724. Therefore, Kessler, in combination with Hirschman, renders this claim obvious.

[71] https://www.radio-electronics.com/info/wireless/wi-fi/80211-channels-number-frequencies-bandwidth.php, Appendix X
[72] https://www.wired.com/2010/09/wireless-explainer/, Appendix R

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23. Dependent Claim 20: "The combination of claim 18, in which the wireless communication platform is a personal area network."

725. Kessler, in combination with Hirschman, discloses a wireless communication platform which is a personal area network.

726. Kessler discloses a wireless connection between the circuitry in the left and right handle housings and the computing device, creating a wireless communication platform*; see* Kessler ¶80, "The communication modules 80 are adapted to communicate control and/or other signals to the information processing device 70 using a short range wireless communication protocol such as Bluetooth? or WiFi?"

727. A *personal area network,* or PAN, is a computer network organized around an individual person, which is set up for personal use only.[73] Personal area networks are generally used to transmit data between nearby devices (i.e. peer-to-peer[74]), such as computers, phones, printers, game systems, game controllers and tablets. Personal area networks are often deployed with Bluetooth, though they can also be connected through a wireless (wifi) network.

[73] https://www.lifewire.com/definition-of-pan-817889, Appendix S
[74] peer-to-peer – "denoting or relating to computer networks in which each computer can act as a server for the others, allowing shared access to files and peripherals without the need for a central server." Google Dictionary, Appendix T

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728. In light of Kessler's disclosures, a POSITA would have understood that its communication platform would include being a personal area network. Therefore, Kessler, in combination with Hirschman, renders this claim obvious.

24. Summary

729. In summary, based on the above analysis, it is my opinion that Kessler, in combination with Hirschman, renders obvious each of claims 1-3, 5-6, 9-10, and 13-20 of the ‘119 patent.

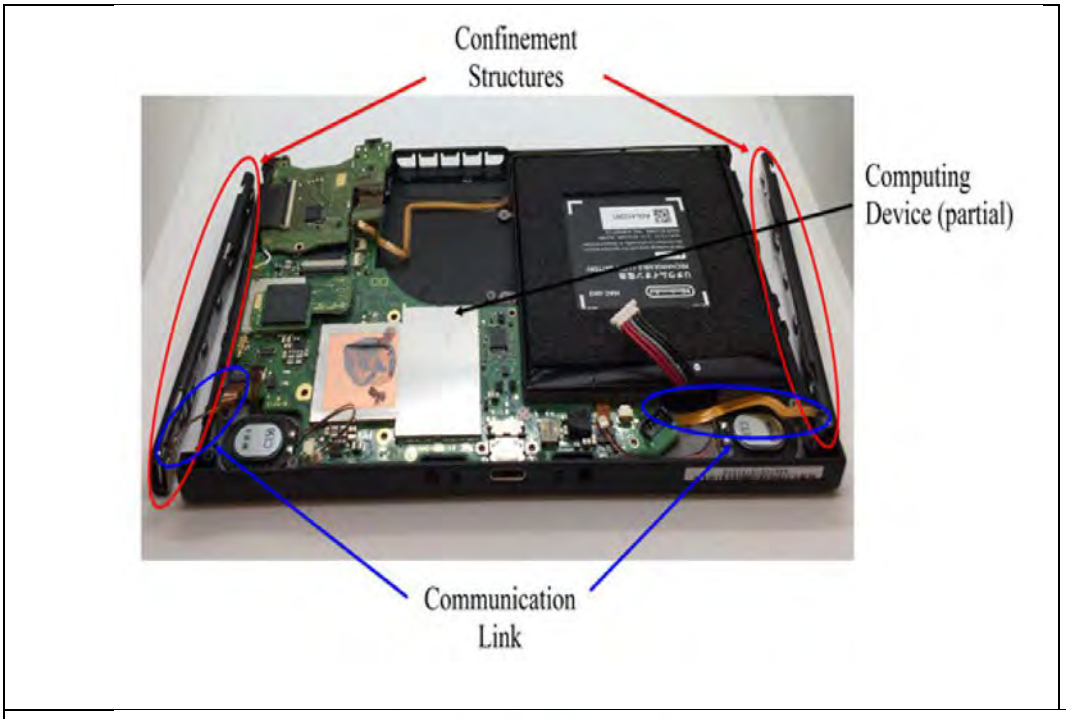
F. Obviousness Based on Hirschman

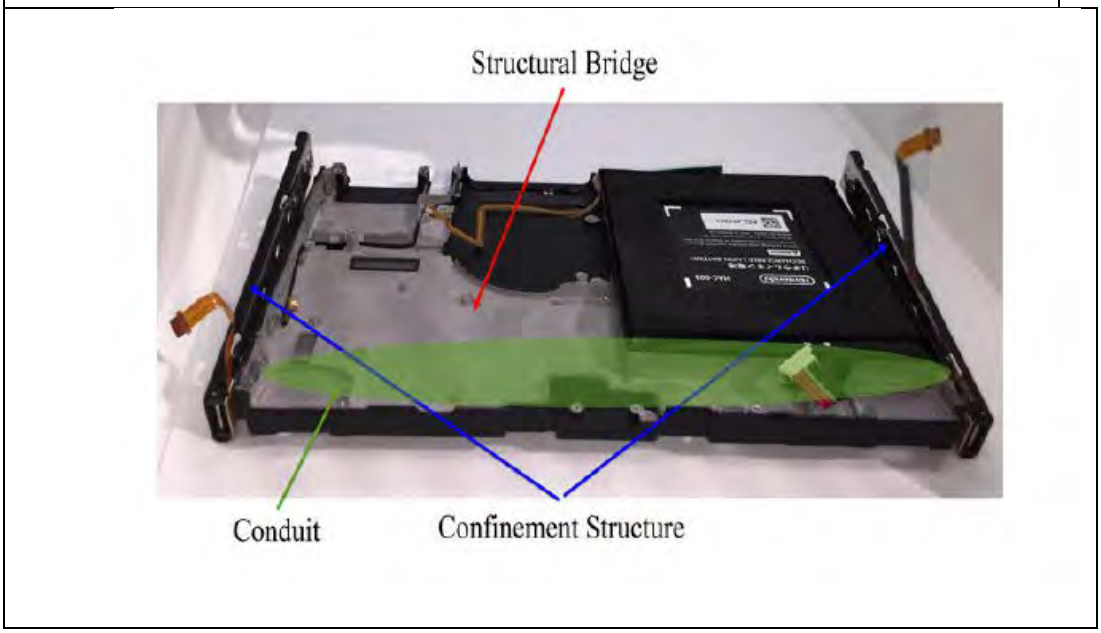
730. Below is a claim analysis that analyzes Hirschman using Patent Owner's apparent constructions and view of the ’119 patent's claim 1. While I do not agree that Hirschman teaches every limitation of the '119 patent as properly construed, this analysis demonstrates how Hirschman teaches each and every limitation of claim 1 using Patent Owner's apparent constructions and prior allegations.

731. With regards to my analysis of Hirschman, I disagree with Plaintiff’s overly broad claim constructions regarding certain terms of the ‘119 patent as Patent Owner appears to have applied them to Defendant’s Switch game console in related litigation. For example, Gamevice explicitly accused the Nintendo’s switch of satisfying the ’119 patent’s *confinement structure* limitation based on side walls to the Switch, the *structural bridge* based on the back of the Switch, and the

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conduit based on what Gamevice called as a passageway on the structural bridge. This is shown in the following images from the complaint that Gamevice filed in the Central District of California, a complaint which was voluntarily dismissed prior to service on Nintendo.





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732. As shown above, Patent Owner appears to interpret the term "structural bridge" to include a structural member which can be internal to (and part of) the computing device. Based on my read of the '119 patent, as explained above, I believe that the term "structural bridge" refers to *a member separate from, and external to, the computing device that connects the confinement structures one to the other whether or not a computing device is present.* Having a structural bridge that is simply part of the computing devices makes no sense in light of the '119 patent's disclosures and claims, which are all directed to a game accessory device that is separate from and works with a pre-existing computing device.

733. Similarly, Patent Owner appears to assert that a conduit is simply any "passageway" or space inside of a computer, but that is contrary to the '119 patent's use of the term, the disclosures, and the plain and ordinary meaning of the term. And as for the confinement structures, Patent Owner simply points to the sidewalls of the Nintendo Switch--not components separate from the computing device that confine that device and are part of a game controller accessory.

734. However, in the event that Plaintiff's constructions are adopted by the Board, Hirschman renders claim 1 obvious. I have applied those constructions to my analysis of Hirschman, which follows below.

1. Claim element 1(a): "A combination comprising:

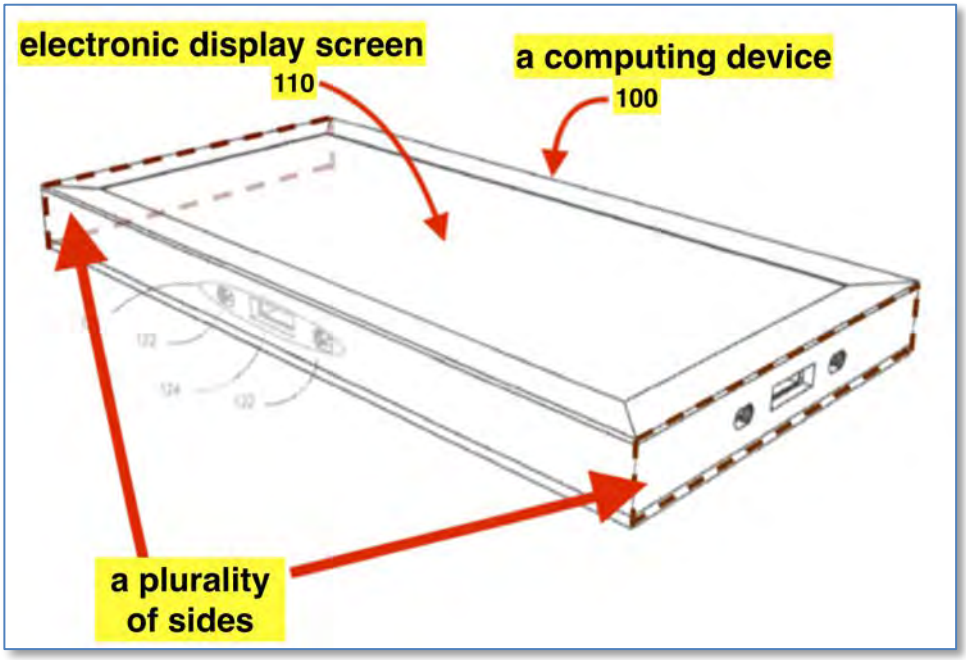
735. Hirschman is a combination of claimed elements, as described below.

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2. Claim element 1(b): "a computing device, the computing device providing a plurality of sides, each of the plurality of sides are disposed between an electronic display screen of the computing device and a back of the computing device;"

736. Hirschman discloses a computing device, the computing device providing a plurality of sides, each of the plurality of sides [are] disposed between an electronic display screen of the computing device and a back of the computing device.

737. For instance, Fig. 1 of Hirschman discloses a computing device 100, which provides a plurality of sides, each of which are disposed between an electronic display screen 110 and a back of the computing device*; see* Hirschman ¶52 "In this example, a portable computer system 100 may include a touch screen display 110…"



Hirschman Fig. 1 (modified and annotated)

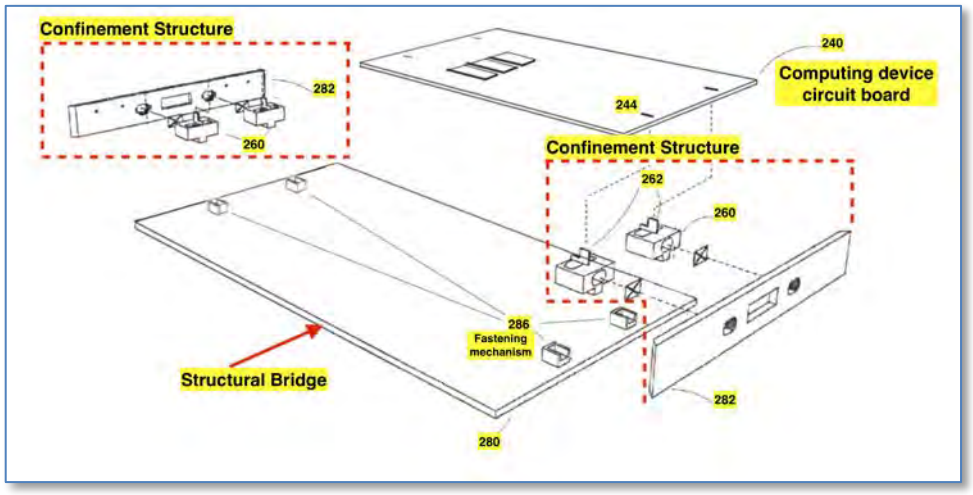
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3. Claim element 1(c): "a communication port interacting with the computing device, the communication port providing a communication link and a pair of confinement structures, the pair of confinement structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device;"

738. Hirschman discloses a communication port interacting with the computing device, the communication port providing a communication link and a pair of confinement structures, the pair of confinement structures adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device—according to Patent Owner's apparent view of this limitation.

739. Under Patent Owner's view, Hirschman would disclose a communication port interacting with the computing device as shown below, providing a pair of confinement structures, in the form of sidewalls 282, with their attached retention elements 260*; see* Hirschman ¶57 "The chassis 280 may include sidewalls 282, which may contain cutouts in the shape and size to receive retention posts 162 and communications connectors 164…" See Figure 3 below, modified to highlight the referenced elements:

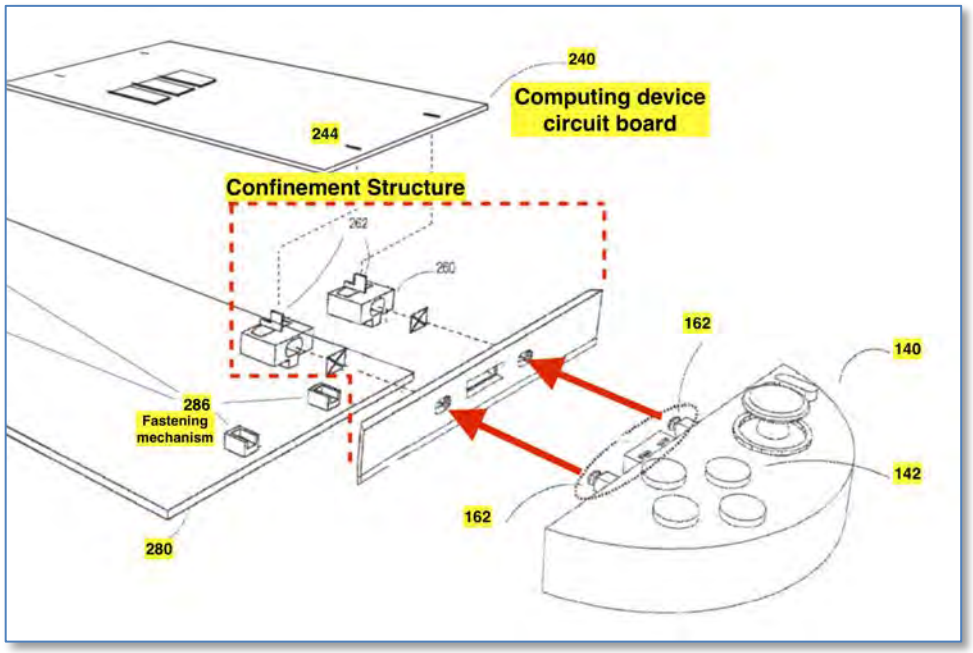
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Hirschman Fig. 3 (modified and annotated)

740. Hirschman further would disclose a communications link in the form of retention structures 260, which can receive electrical signals when mated with retention posts 162*; see* Hirschman ¶60 "Communication signals may travel through retention structures 260 and retention posts 162…" The retention structure 260 is electronically connected to the computing device through the dorsal fins 262, which mate with the computing device circuit board 240 through slot 244*; see* Hirschman ¶58 "The retention structures 260 may have a 'dorsal fin' structure 262, which may fit into slots 232 and 244… [which] may be electrically conductive and may be part of at least one of the circuits…" The image below, built as a composite of images 2A and 3, illustrates the structural and electrical connection between the retention posts 162 (carrying signals from the input device) and the retention structure 260, which connects those signals to the computing device circuit board 240 through the dorsal fins 262 mating with slots such as 244.

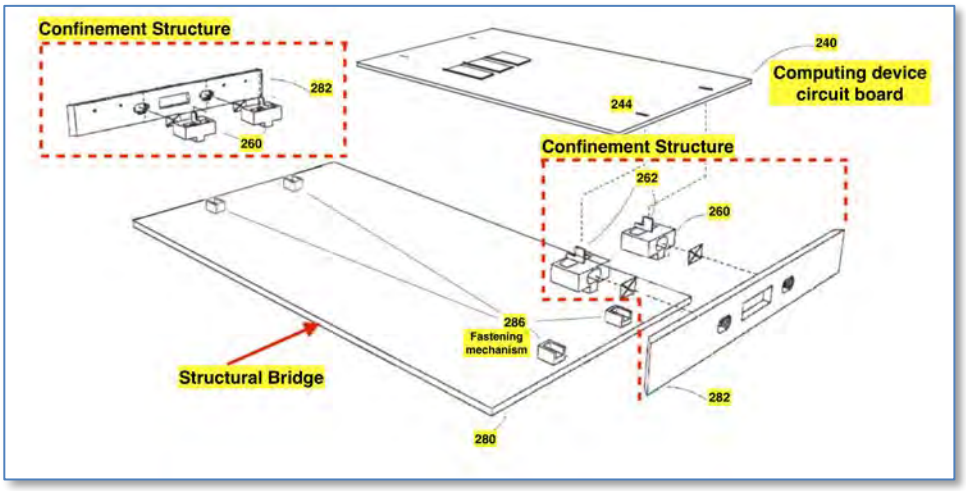
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Hirschman - Composite of images 2A and 3 (modified and annotated)

741. Hirschman Fig. 3 (modified for clarification) further confirms that the pair of supposed confinement structures (according to Patent Owner's view) are adjacent to and confining the computing device on at least two opposing sides of the plurality of sides of the computing device, as indicated by the relative position of the computing device circuit board 240, which sits above the structural bridge (according to Patent Owner's interpretation of the term), and in between the two confinement structures (again according to Patent Owner's interpretation):

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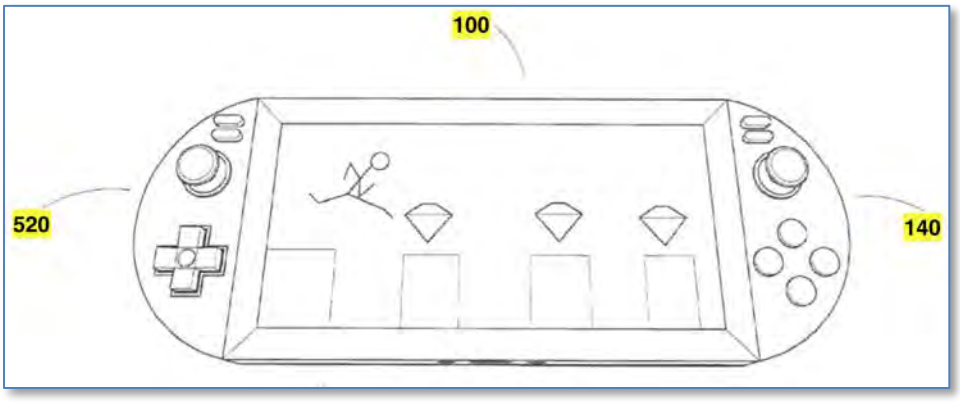
Hirschman Fig. 3 (modified and annotated)

4. Claim element 1(d)(i): "an input device attached to and in electronic communication with the communication port;"

742. Hirschman discloses two game accessory modules 140 and 520 that provide an input device to the computing device 100. As discussed above, the two game accessory modules are in electronic communication with the communication port through at least the retention posts 162 and the retention structures 260, which are part of the confinement structures*; see* Hirschman ¶60 "Communication signals may travel through retention structures 260 and retention posts 162…"

743. See figure 14A below, which shows the input device (game accessory modules 140 and 520) attached to the supposed confinement structures (under Patent Owner's view) through the insertion of the retention posts 162 and USB connections:

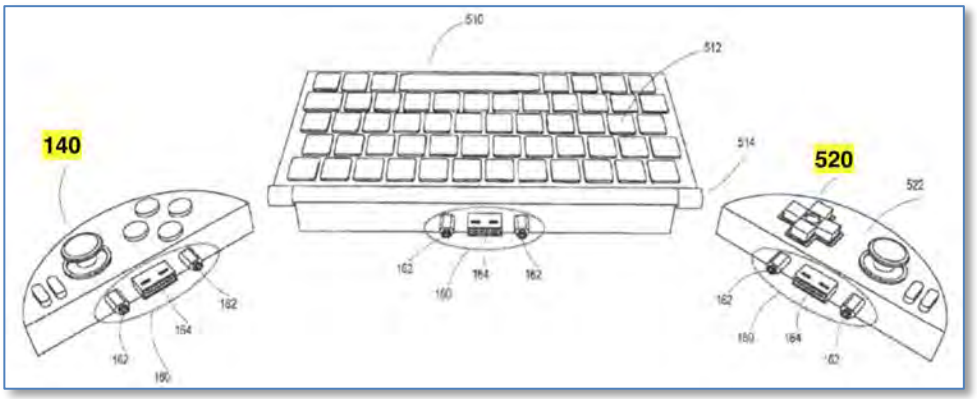
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Hirschman Fig. 14A (annotated)

5. Claim element 1(d)(ii): "the input device providing a pair of control modules, the pair of control modules providing input module apertures, each input module aperture secures an instructional input device, wherein said input module apertures are adjacent each of the at least two opposing sides of the plurality of sides of the computing device, and wherein the input device is a separate and distinct structure from the communication port, forming no structural portion of the communication port; and"

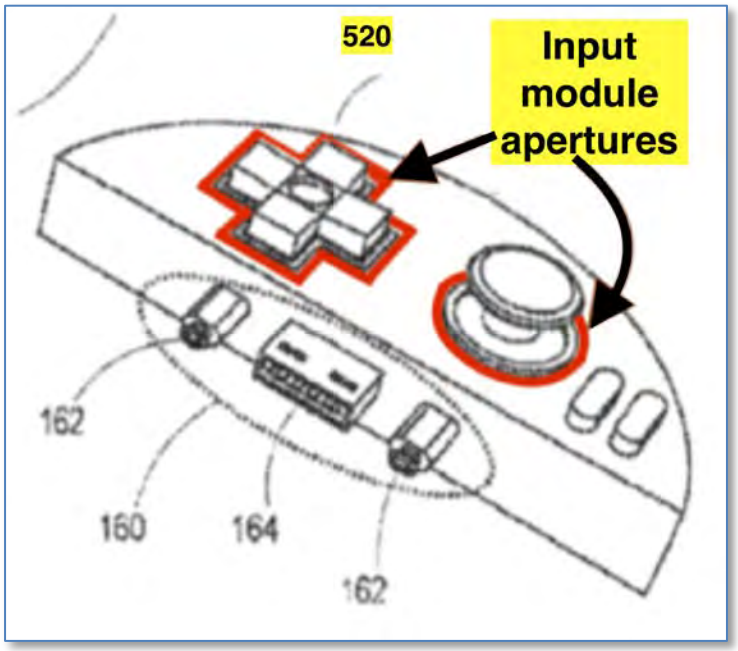
744. As discussed, Hirschman discloses an input device comprised of two control modules (game accessory modules) 140 and 520. For example, Fig. 6 of Hirschman shows game accessory modules 140 and 520, which include common input devices such as buttons, a joystick and a d-pad.



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Hirschman Fig. 6 (annotated)

745. As one of skill in the art would understand, these types of input devices (buttons, joysticks, etc.) feed through an opening (i.e. aperture) in the plastic casing of the game accessory module. Each of the game accessory modules provides these input module apertures, which secure an instructional input device. The closeup below, taken from Fig. 6, highlights the input module apertures associated with the d-pad and joystick input devices of Hirschman:

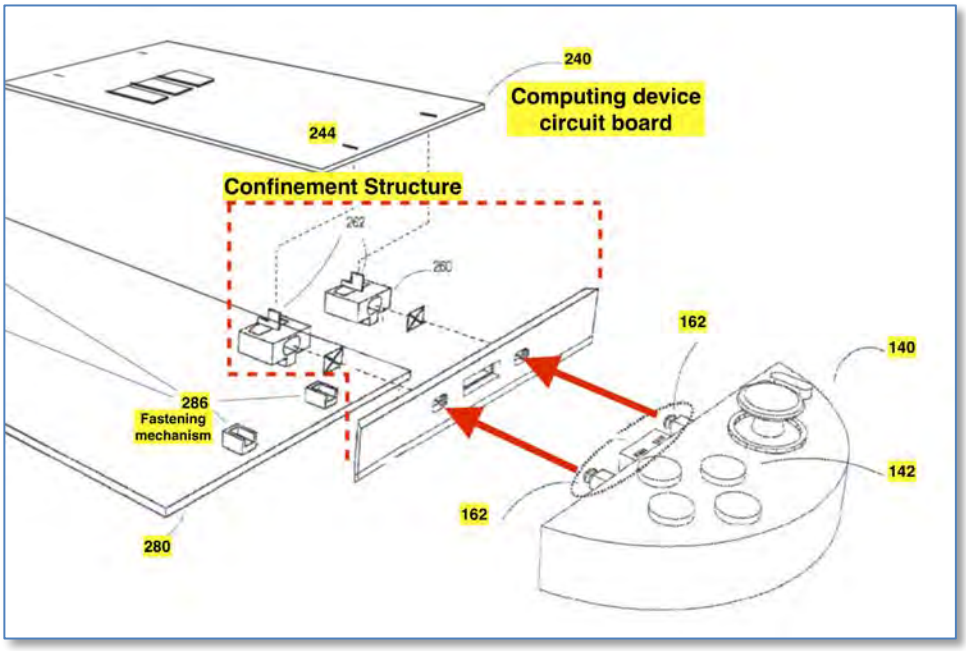


Hirschman Fig. 6 closeup (annotated)

746. The composite image of Figs. 2A and 3, as used earlier and shown below, illustrates that the input device, comprised of the two game accessory modules 140 and 520, is a separate and distinct structure from the supposed communication port (according to Patent Owner's interpretation), forming no

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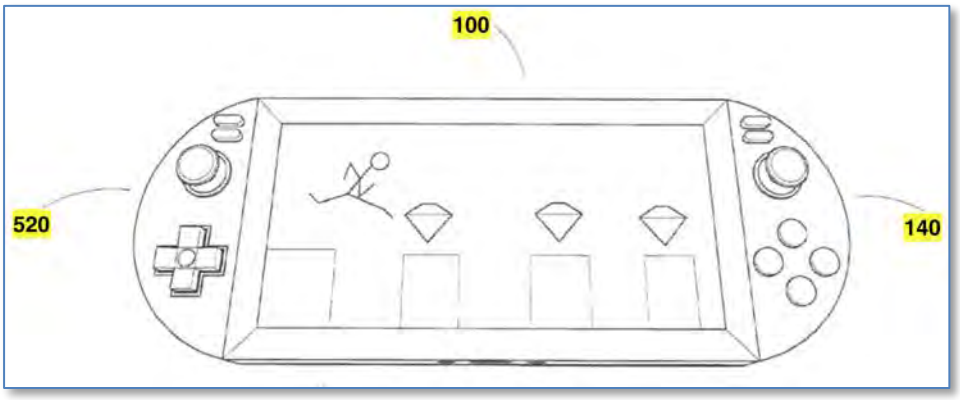
structural portion of the communication port*; see* Hirschman ¶11, "Fig. 6 illustrates a variety of accessories designed to be received by a portable computer system …"; and ¶93, "… so that a user may remove and/or attach multiple accessories…"



Hirschman - Composite of images 2A and 3 (modified and annotated)

747. Finally, Fig. 14A shows the game accessory modules with input module apertures attached to the supposed communications port and the computing device, wherein said input module apertures are adjacent each of the at least two opposing sides of the plurality of sides of the computing device.

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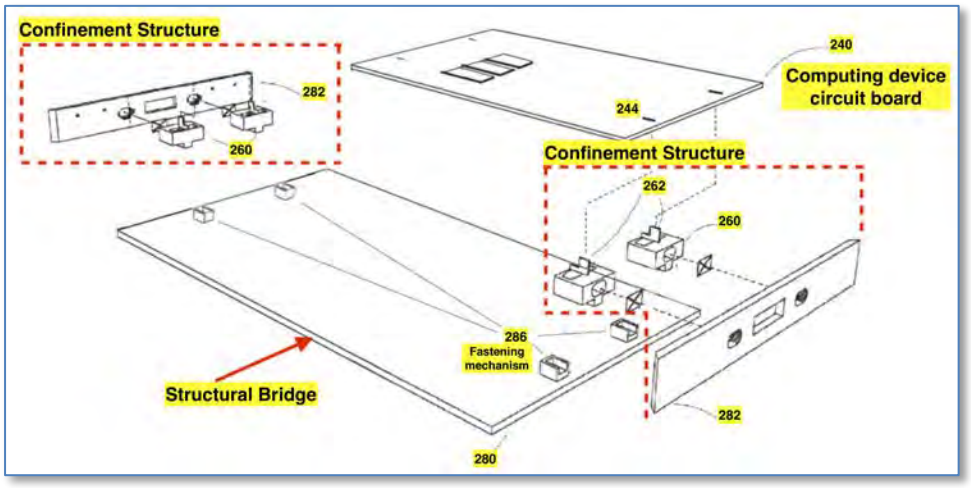
Hirschman Fig. 14A (annotated)

6. Claim element 1(e)(i): "a structural bridge securing the pair of confinement structures one to the other,"

748. Under Patent Owner's constructions of confinement structures and structural bridge, which I believe are incorrect and unsupported by the '119 patent's specification, Hirschman disclosed a structural bridge securing the pair of confinement structures one to the other.

749. As shown below, Hirschman discloses the supposed confinement structures (under Patent Owner's view) made up of side walls 282 in combination with retention structures 260. These confinement structures are secured to the structural bridge (chassis 280) (according to Patent Owner's view), which secures the supposed confinement structures one to the other. While I do not agree that these disclosures would satisfy claim 1, they are extremely similar to how Patent Owner has accused the Nintendo Switch, as shown above. If the '119 patent is construed as Patent Owner appears to believe it should, then Hirschman taught this limitation explicitly.

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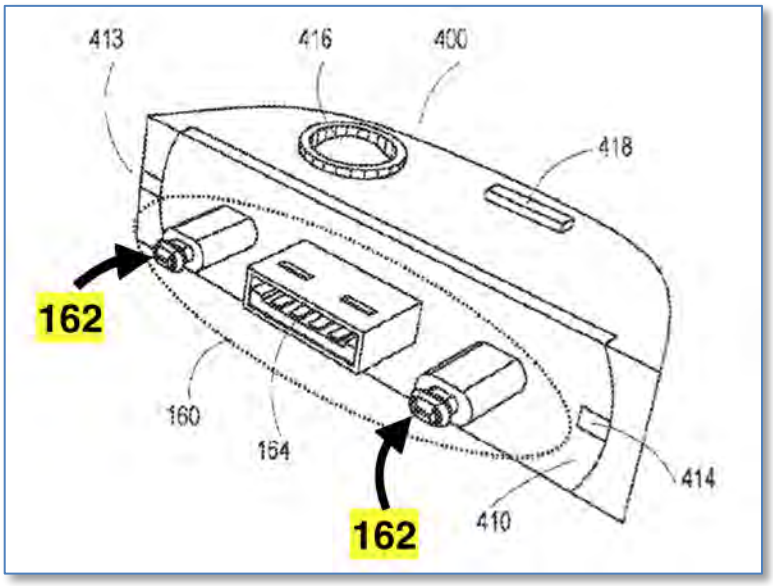
Hirschman Fig. 3 (modified and annotated)

7. Claim element 1(e)(ii): "in which each of the pair of control modules provide an attachment structure cooperating with the communication port, each attachment structure secures the input device to the communication port,"

750. Similarly, under Patent Owner's apparent constructions, Hirschman discloses a pair of control modules which provide an attachment structure cooperating with the communication port, each attachment structure secur[ing] the input device to the communication port.

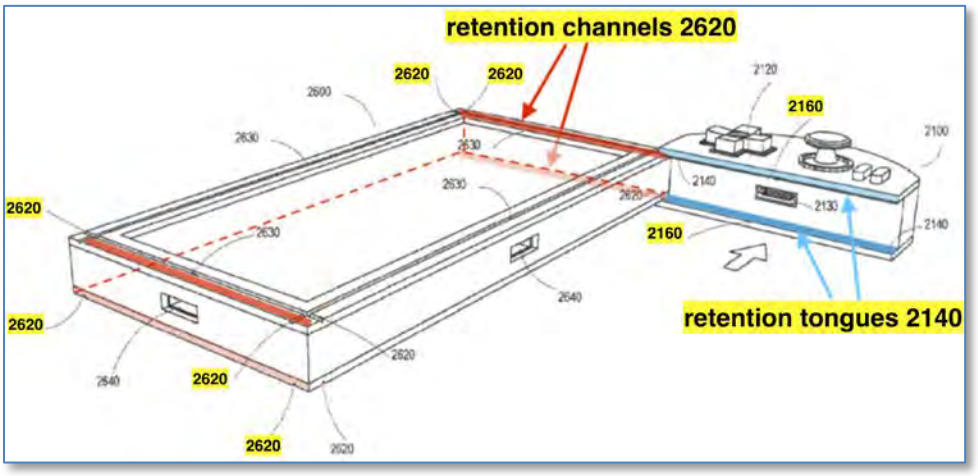
751. The closeup below, taken from Fig. 6, shows one of the two control modules of Hirschman providing an attachment structure (under Patent Owner's view) in the form of retention post 162, which cooperates with the retention structures 260 of the communication port, securing the input device to the communication port*; see* Hirschman ¶64, "Fig. 4C is a partial cross-sectional view of the retention element 260 of Fig. 2 receiving the retention post 162 of Fig. 2A."

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Hirschman Fig. 6 (closeup, annotated)

752. Hirschman further discloses a second embodiment in which the pair of control modules provide an attachment structure in the form of retention tongues 2140, which interlock with retention channels 2620 on the communication port, securing the input device to the communication port*; see* Hirschman ¶88, "Figs. 20A-34B illustrate a portable computer system configured to receive, and become integrally engaged with, a game accessory according to an embodiment of the present invention… the portable computer system 2600 may include retention channels 2620 that may accept retention tongues 2140 of an accessory 2100 in a lateral fashion." See Figure 20B, shown below, modified and annotated to highlight the retention tongues and retention channels. This attachment structure is very similar to the one Patent Owner accused in the Nintendo Switch.



Hirschman Fig. 20B (modified and annotated)

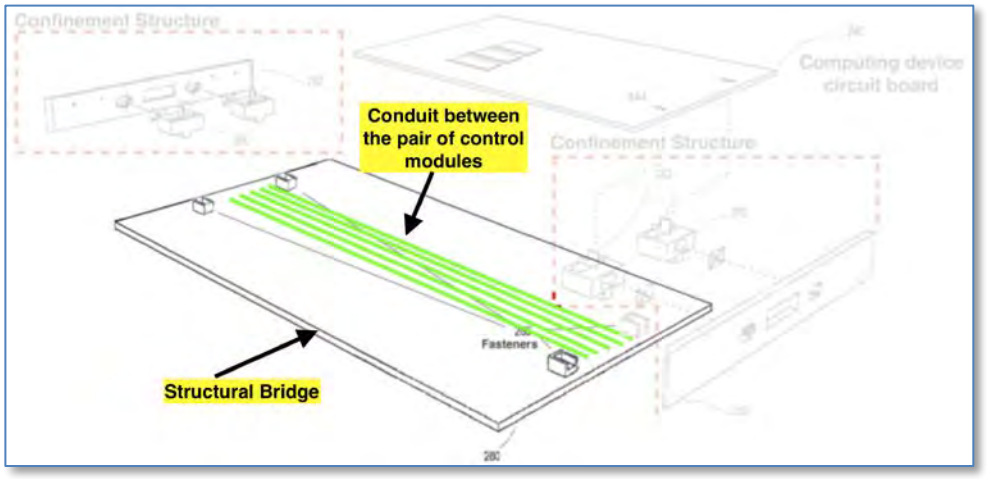
8. Claim element 1(f)(i): "and in which the structural bridge comprising: a conduit between the pair of control modules;"

753. Under Patent Owner's constructions, Hirschman discloses a structural bridge comprising a conduit between the pair of control modules.

754. As shown below, Hirschman discloses the supposed confinement structures made up of side walls 282 in combination with retention structures 260. These structures are secured to the supposed structural bridge (chassis 280), which secures them one to the other in the same manner as the Nintendo Switch. Fig. 3 below, modified and annotated to highlight the relevant components, shows the position of the supposed conduit (under Patent Owner's apparent construction) between the pair of control modules. In essence, it would be the space next to or around a battery on the inside of the device. I disagree that this could be a conduit under a proper interpretation, but according to Patent Owner's prior allegations

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(and thus, its interpretation of the ’119 patent), this disclosure is sufficient to teach this limitation.



Hirschman Fig. 3 (modified and annotated)

9. Claim element 1(f)(ii): “[the structural bridge comprising:] and a fastening mechanism cooperating with the pair of confinement structures, the fastening mechanism secures the pair of confinement structures one to the other.”

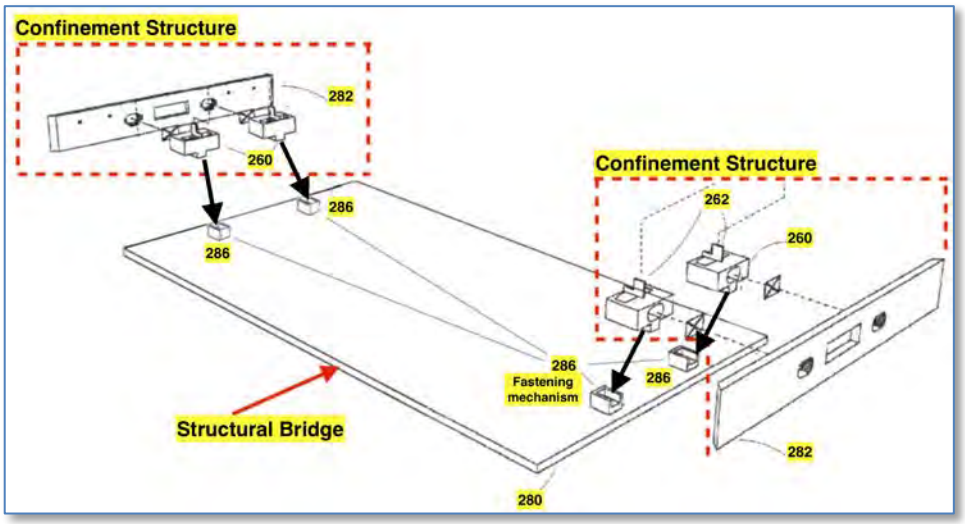
755. Finally, applying Patent Owner's apparent constructions, Hirschman would disclose a structural bridge comprising a fastening mechanism cooperating with the pair of confinement structures, the fastening mechanism secures the pair of confinement structures one to the other.

756. As shown below, Hirschman discloses a fastening mechanism in the form of fasteners 286, which cooperate with the supposed confinement structures through the retention element 260 to secure the pair of supposed confinement structures to the chassis 280 (which is a structural bridge according to Patent Owner's view), and one to the other*; see* Hirschman ¶57, “The battery 250 may be

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partially secured by brackets 284 and 286, which may be extruded from or attached to the surface of the chassis 280... The battery 250 may also be secured by retention structures 260, which may be inserted into and secured by the brackets 286."

757. Fig. 3 below, modified and annotated, shows these structures.



Hirschman Fig. 3 (modified and annotated)

10. Summary

758. In summary, based on the above analysis, it is my opinion that Hirschman renders obvious claim 1 of the '119 patent to the extent Patent Owner's apparent constructions are adopted.

XI. CONCLUSION

759. For at least the preceding reasons, I believe that claims 1-10 and 13-21 of the '119 patent are unpatentable pursuant to 35 U.S.C. § 103.

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760. This declaration is based on my present assessment of materials and information currently available to me. My investigation and assessment may continue, which may include reviewing documents and other information that may yet to be made available to me. Accordingly, I expressly reserve the right to continue my study in connection with this case and to expand or modify my opinions and conclusions as my study continues.

761. I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001, and that such willful false statements may jeopardize the petition for *inter partes* review.

Dated: 8/27/2018

Garry Kitchen

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Fairleigh Dickinson University, Teaneck, New Jersey
Eta Kappa Nu Honor Society, 1977-1980
Engineering Merit Scholarship - Matsushita Corp, 1978-1979

AFFILIATIONS

International Game Developers Association (IGDA)
Academy of Interactive Arts and Sciences (AIAS)
Institute of Electrical & Electronics Engineers (IEEE)
Eta Kappa Nu - Honor Society of the IEEE
National Academy of Television Arts & Sciences (NATAS)
Board of Advisors – National Videogame Museum (nvmusa.org)
Board of Advisors – Fairleigh Dickinson University School of the Arts
BOSSLEVEL - The World's Top 100 Game Developers (invitation only)
Elite Expert for IMS Expert Services, Pensacola, Florida
Guidepoint Global (FNA Vista Research - Society of Industrial Leaders)
Coleman Research Group

EXPERIENCE

- Conceived and led development of Nickelodeon's AddictingGames mobile app for iOS, which rose to #1 in the Apple app store within 72 hours of launch, becoming the most downloaded app in Viacom's history.

- 30+ years of technical management experience running game development companies, with an unmatched 17 years of management experience in Internet gaming.

- Hands-on technical and creative experience in all genres of game development, including console, PC retail and download, online, mobile and dedicated electronic.

- Leading Expert Witness for the video game industry, with over 30 years of experience in technical consulting on patent infringement, copyright, software development, and business issues for clients such as Nintendo, Sony Computer Entertainment, Zynga, Activision, Taito, and Hasbro (see **Expert Consulting Experience** section below).

EXPERIENCE
(cont'd)

• Strategic business planning - a history of anticipating and influencing industry trends with pioneering initiatives:
1980 Reverse engineered the Atari 2600 in anticipation of the video game revolution
1986 Established the 1st North American-based Nintendo development studio
1996 Pioneered *Advergaming* with the launch of LifeSavers' Candystand.com
2005 Applied dynamic in-game advertising technology to casual games
2008 Repositioned Skyworks as leading iPhone publisher with over 25M downloads

• Expertise in developing comprehensive business plans, with application toward raising investment capital, through IPO or private equity placement.

• Recognized as an industry expert in video gaming by numerous trade conferences, including Digital Hollywood, iMedia Breakthrough, GDC, CES, Gamer Technology Conference, Casual Game Conference, Advertising in Games conference, VNU Digital Marketing conference, National Cable Show and the QualComm QTech conference.

• Experience in dealing with broadcast and print media, including CNBC, ABC Eyewitness News, CNN, Good Morning Atlanta, The Today Show, Business Week and various consumer and trade publications.

• Personally developed video game software products generating career retail sales in excess of $350 million.

• Co-founded Skyworks Technologies, Inc., an industry pioneer in *Advergames* - sponsorship-supported video games used as advertising vehicles. Skyworks was named a Top 50 Interactive Agency by Advertising Age for the years 2003 and 2004. Skyworks' client list included Nabisco/Kraft Foods, BMW, Toyota, Ford, PepsiCo, Campbell's, Fox Sports, CBS, Mattel, Weather Channel, Microsoft Network, Yahoo!, Miller Brewing Company, GlaxoSmithKline and MTV.

• Developed strategy and business plan for the Casual Games Network (CGN), Skyworks' initiative applying dynamic in-game advertising to online casual games, partnering with Massive Incorporated.

EXPERIENCE
(cont'd)

• Co-founded Absolute Entertainment, Inc., console game publisher licensed by Nintendo, Sega, Sony, 3DO and Atari and video game developer of over 100 marketed titles from 1986 to 1995, generating product retail sales of over $300 million. Successfully lead Absolute through oversold IPO, raising $12 million.

• Consulted for RCA David Sarnoff Research Labs (1986-1987) on entertainment applications of Digital Video Interactive (DVI), the first technology to store digital full-motion video on a CDROM.

• Designed & programmed Atari 2600 adaptation of hit arcade game Donkey Kong, 1982 wholesale revenues in excess of $100 million on four million units sold.

• Conceived, designed and developed Bank Shot, an innovative electronic pool game marketed by Parker Brothers, named "10 Best Games of 1980", *Omni Magazine*.

• Reverse-engineered Atari 2600 game system in 1980, creating one of the first third party 2600-compatible game cartridges - Space Jockey.

EMPLOYMENT HISTORY

President/CEO
SGK Service Inc., Danville, California
March 2007 - Present

Vice President Game Publishing
Viacom Media Networks, San Francisco, California
December 2010 - May 2012

Chief Operating Officer
Skyworks Interactive, Inc., Hackensack, New Jersey
December 2007 - September 2009

Chairman, President & CEO
Skyworks Technologies, Inc., Hackensack, New Jersey
November 1995 - December 2007

EMPLOYMENT HISTORY
(cont'd)

Chairman, President & CEO
Absolute Entertainment, Inc., Upper Saddle River, New Jersey
March 1986 - November 1995

Senior Designer
Activision, Inc., Mountain View, California
June 1982 - March 1986

President
Imaginative Systems Software, New Milford, New Jersey
November 1981 - May 1982

Engineer/Designer
James Wickstead Design Associates, Cedar Knolls, New Jersey
April 1976 - October 1981

HONORS AND AWARDS

- U.S. Patent #8,407,090
  Dynamic reassignment of advertisement placements to maximize impression count
  Publication date – March 26, 2013

- 2012 Official *WEBBY AWARD* Honoree - Games (Handheld Devices)
  AddictingGames Mobile for iOS platform
  International Academy - Digital Arts & Sciences WEBBY AWARDS - 2012

- Nomination to *Board of Advisors*
  Video Game History Museum (www.vghmuseum.org) - 2010

- Nomination as an *Elite Expert* by IMS Expert Services
  IMS Expert Services (www.ims-expertservices.com) - 2009

- Nomination to the Advisory Committee: "Reinventing Advertising: VOD, PVR, Broadband, Games, PODs & Mobile Consortium"
  Digital Hollywood - 2005, 2006

HONORS AND AWARDS
(cont'd)

• 2004 Nominee – *Advergame of the Year*
The BMI X3 Adventure
Billboard Digital Entertainment Awards (DECA)

• Lifetime Achievement Award in Video Games
Classic Gaming Expo – 2003

• New Jersey Entrepreneur of the Year - Finalist
Inc. Magazine, *Merrill Lynch* and *Ernst & Young* - 1993

• Best Simulation Game
Super Battletank
Game Informer Magazine - 1992

• Sega Seal of Quality Award Nominee - Best Flying/Driving Genesis
Super Battletank
Sega of America - 1992

• Lifetime Achievement Award in Video Games
The Doctor Fad Show
Syndicated educational television program - 1990

• Video Game Designer of the Year
Computer Entertainer Magazine - 1985

• Best Creativity Product - Nominee
Garry Kitchen's GameMaker
SPA Excellence in Software - 1985

• Video Game of the Year - Certificate of Merit
Keystone Kapers
Electronic Games Magazine - 1983

• U.S. Patent #4,346,892
Electronic Pool Game
Bank Shot – handheld game marketed by Parker Brothers - 1981

• Ten Best Games of 1980
Bank Shot
OMNI Magazine - 1980

HONORS AND AWARDS
(cont'd)

• The Games 100 - The Top 100 Games of 1980
Bank Shot
Games Magazine – 1980

• Engineering Merit Scholarship
Panasonic / Matsushita Corporation of Japan
Fairleigh Dickinson University - 1978, 1979

PUBLICATIONS/SOFTWAREOLOGY

TITLE	PLATFORM	YEAR	PUBLISHER/ LICENSEE	ROLE
Wildfire	Electronic Toy	1979	Parker Brothers	Software
Bank Shot	Electronic Toy	1980	Parker Brothers	Design/Software
Space Jockey	Atari 2600	1980	U.S. Games	Design/Software
3D Supergraphics (with P. Lutus)	Apple II	1980	United Software of America	Assembly Language demos
Reversal	Atari 400/800	1981	Hayden Publishing	Atari conversion from Apple II
Bellhop	Apple II	1982	Hayden Publishing	Co-design/Software
Donkey Kong	Atari 2600	1982	Coleco	Software
Keystone Kapers	Atari 2600	1983	Activision	Design/Software
Pressure Cooker	Atari 2600	1983	Activision	Design/Software
Ghostbusters	Atari 2600	1985	Activision	Software
The Designer's Pencil	C64	1984	Activision	Design/Software
Garry Kitchen's GameMaker	C64	1985	Activision	Design/Software
Crossbow	C64	1986	Absolute	Co-design/Software
Stealth ATF	NES	1989	Activision	Co-design/Software
A Boy and His Blob	NES	1990	Absolute	Co-design/Software
Battletank	NES	1990	Absolute	Design/Software
Destination Earthstar	NES	1990	Acclaim	Co-design/Software
The Simpsons: Bart vs the Space Mutants	NES	1991	Acclaim	Co-design/Software
Home Alone	SNES	1992	THQ	Co-design/Software
Super Battletank: War in the Gulf	SNES	1992	Absolute	Design/Software
The Simpsons: Bart vs the World	NES	1992	Acclaim	Co-design/Software
Super Battletank 2	SNES	1993	Absolute	Co-design/Software
LifeSavers Chomp	CDROM	1996	LifeSavers	Co-design/Software
Candystand Yipes Hang Gliding	Web/online	1997	LifeSavers	Design/Software
Candystand Yipes Skate Race	Web/online	1997	LifeSavers	Design/Software
Candystand Video Poker	Web/online	1997	LifeSavers	Design/Software
Candystand Yipes Coloring Book	Web/online	1997	LifeSavers	Design/Software
Candystand Grafitti Contest	Web/online	1997	LifeSavers	Design/Software
Candystand Where in the world...	Web/online	1997	LifeSavers	Design/Software
Bet Your Lifesavers TV Trivia	Web/online	1997	LifeSavers	Design/Software
Candystand Snowboarding	Web/online	1997	LifeSavers	Design/Software
Nabisco Chipulator	Web/online	1997	Nabisco	Design/Software

Bubble Yum Screensaver	Web/online	1998	LifeSavers	Design/Software
Candystand Gummiworks Construction Kit	Web/online	1998	LifeSavers	Design/Software
Ford Basketball Shootout	Web/online	1998	Ford	Design/Software
H.O.R.S.E. Basketball Shootout	Web/online	1998	Sportcut	Design/Software
Bet Your Lifesavers '80s TV Trivia	Web/online	1998	LifeSavers	Design/Software
Fruit Stripe Puzzle game	Web/online	1999	LifeSavers	Design/Software
Ford Fallout	Web/online	1999	Ford	Design/Software
Premium Jigsaw Puzzle Palace	Web/online	1999	Nabisco	Design/Software
Nabiscoworld Ball Toss	Web/online	1999	Nabisco	Design/Software
Nabiscoworld Holiday House	Web/online	1999	Nabisco	Design/Software
Nabiscoworld Greeting Cards	Web/online	1999	Nabisco	Design/Software
S.I. H.O.R.S.E. Basketball Shootout	Web/online	1998	CNN/SI	Design/Software
Candystand Flavor Factory	Web/online	2000	LifeSavers	Design/Software
Candystand 2 Minute Drill	Web/online	2000	LifeSavers	Design/Software
Cornnuts Nuttin' But Net	Web/online	2000	Nabisco	Design/Software
Bell Atlantic Nothing But Net	Web/online	2000	Bell Atlantic	Design/Software
Home Run Derby	Web/online	2001	Century 21	Design/Software
Big League Bash	Web/online	2001	Fox Sports	Design/Software
Kraft Puzzle Maker	Web/online	2001	Kraft	Design/Software
GSK Trivia	CDROM	2001	GSK	Design/Software
Stars Academy Mess of Mass	Web/online	2001	Stars Academy	Design/Software
Stars Academy Space Trivia	Web/online	2001	Stars Academy	Design/Software
GSK Coloring Book	Web/online	2001	GSK	Design/Software
Big Barney Chase board game	Web/online	2001	Kraft/Post	Design/Software
Mission Code Red	Web/online	2001	Pepsi	Design/Software
Trolli Kaboom	Web/online	2002	LifeSavers	Design/Software
Candy Drops	Web/online	2002	LifeSavers	Design/Software
Smack Dab in the Middle	Web/online	2002	Nabisco	Design/Software
Intelsat Satellite game	CDROM	2002	Intelsat	Design/Software
Red & Ned racing	Web/online	2002	Kraft	Design/Software
Tombstone Racer	Web/online	2003	Tombstone Pizza	Design/Software
Barney Spy Caper	Web/online	2005	Kraft/Post	Software
Dandy Drops	Web download	2004	Skyworks	Design/Software
VU Role Playing Game	Web/online	2004	LifeSavers	Design/Software
Acrobats	Web/online	2004	Nabisco	Design/Software
Air Hockey	Web/online	2004	LifeSavers	Design/Software
Poker Puzzle	Web/online	2004	Nabisco	Design/Software
Board Game of Life	Web/online	2004	Fidelity	Design/Software
Swap and Drop	Web/online	2004	Weightwatchers	Design/Software

Craver Catch	Web/online	2005	Kraft/Post	Design/Software
Acrobats Deluxe	Web download	2005	Skyworks	Design/Software
March of the Penguins	DS	2006	DSI	Design
Grind and Grab	Web/online	2006	LifeSavers	Design/Software
Spiderman City game	Web/online	2007	Kraft/Nabisco	Design/Software
Arcade Hoops	iOS	2008	Skyworks	Co-design/Software
Arcade Bowl	iOS	2008	Skyworks	Software
Air Hockey	iOS	2009	Skyworks	Design
World Cup Table Tennis	iOS	2009	Skyworks	Exec Producer/Design
Match 3 Poker	iOS	2009	Skyworks	Design/Software
Skyscrapers	iOS	2009	Skyworks	Design/Software
Iron Horse	iOS	2010	AppStar Games	Co-design
Fling Pong	iOS	2010	AppStar Games	Design/Software
Leslie West String Benda'	iOS	2010	AppStar Games	Co-design
Jelly Cannon	iOS	2012	Nickelodeon	Executive Producer
Addicting Games	iOS	2012	Nickelodeon	Exec Producer/Design
Scribble Hero	iOS	2012	Nickelodeon	Executive Producer

APPENDIX B



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APPENDIX C



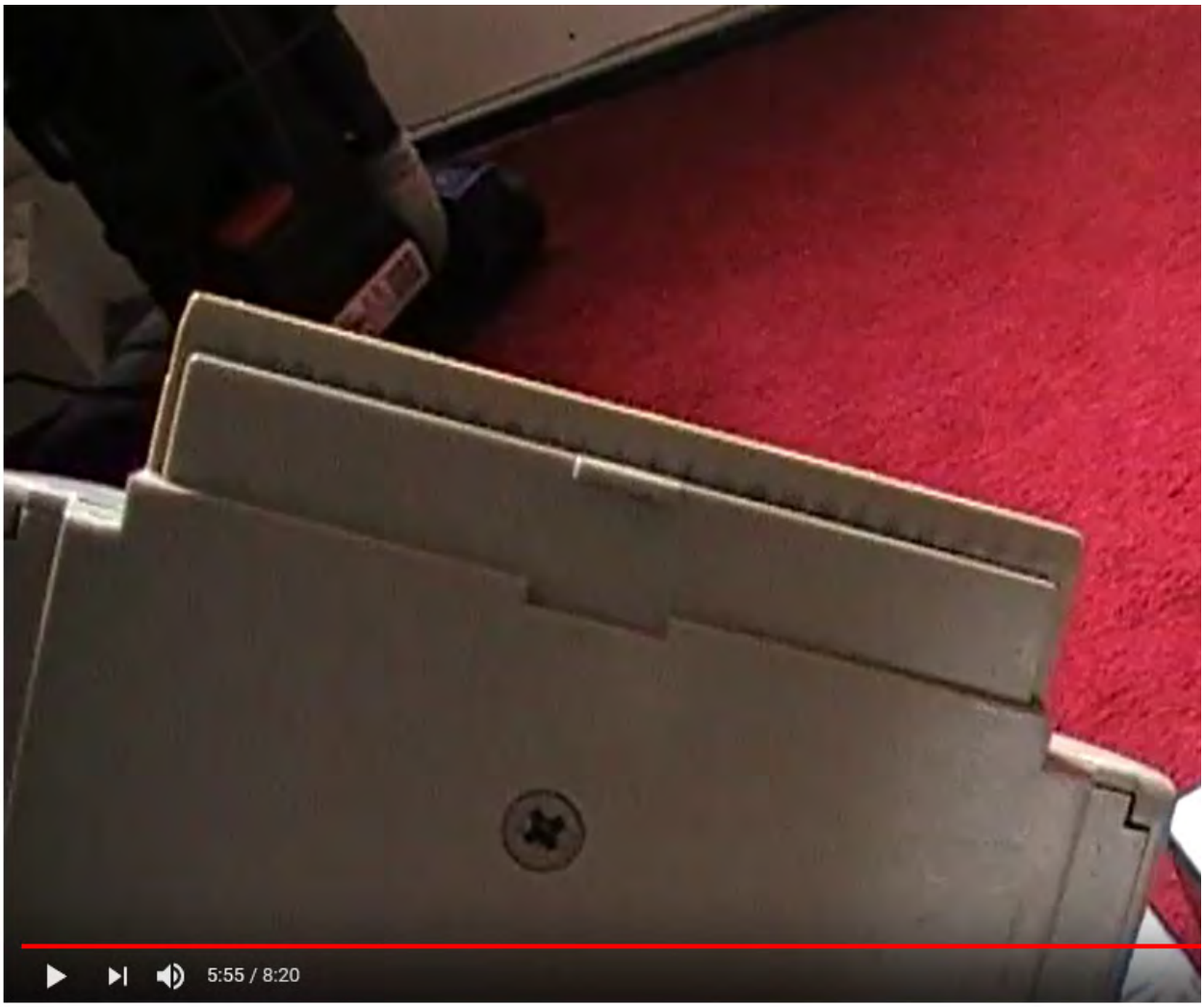
Nintendo, Exhibit 1002
Petitioners NINTENDO CO., LTD., et al.,
Ex. 1036, IPR2023-00643, Pg. 308

APPENDIX D



Nintendo, Exhibit 1002
Petitioners NINTENDO CO., LTD., et al.,
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APPENDIX E



mb microvision

Nintendo, Exhibit 1002

APPENDIX E

Watch YouTube videos with Chrome. Yes, get Chrome now.



mb microvision

doubledragonuk

27

1,146 views

Published on Sep 16, 2011

12 MB Microvision`s 1979, French / U.K. / U.S./ boxed, also U.K. & U.S. boxed games cartridges, Dutch/Holland 2 battery Microvision Boxed Complete & Working
French 2 battery Microvision is missing instructions & Working 2 battery version

Game Sea Duel - 1980 (YouTube Gaming)

COMMENTS • 4

Add a public comment...

ReplayRetro 6 years ago
Fantastic Microvision collection! very jealous

doubledragonuk 6 years ago
Yes ive had no problems

Michael Hulme 6 years ago
Curious, can the U.S. Microvision unit play the U.K. games??
I have a couple of working U.S. units, and I was just curious if I could utilize a U.K. cartridge in mine? ...Thanks - Nice collection! :-)

Up next Autoplay



MB Games Microvision | Ashens
ashens
491,604 views



Greatest Trick Plays in Baseball History
Savage Brick Sports
Recommended for you



Robin Williams on Carson w/ Jonathan Winters 1991
MaTeOWaNnA ReMaSt'RzEr
Recommended for you



His Voice Is So Emotional That Even Simon Started To Cry!
Kevas Music
Recommended for you



Rodney Dangerfield Has Carson Hysterically Laughing
Rodney Dangerfield
Recommended for you



Présentation de la microvision.
Mr. Game retro
71 views



This Is Why The Book Of Enoch Was Removed From
Think About It
Recommended for you

Stars NBA dressed in the old People in the game + bonus (HD)
Funn GT
Recommended for you
6:11

This is what happens when you reply to spam email | James
TED
Recommended for you
9:49

Arriving at Fort Jackson for Basic Training
National Guard
Recommended for you

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APPENDIX E





Michał Pawlak 5 years ago

Wow, this was way ahead of it's time. I really wonder why Nintendo didn't go with this concept in their Game & Watch. Do all of these still work ? I've read that the production quality of the screen wasn't that high and a lot of Microvisions suffer from screen rot.



14:15

Millionaire - Whiz Kid Sojas Wagle's Path to the Top (Nov. 15,
Chad Mosher
Recommended for you

14:03

Heart of collecting is gone -Video Game Collecting Rant and
NatestalgiaKid
3,796 views

15:48

1979 Milton and Bradley Microvision System Review
ukretrogameaddict
8,253 views

18:27

BEST Magic Show in the world - Genius Rubik's Cube Magician
Len Ken
Recommended for you

14:01

Milton Bradly Microvision Handheld Review - Gamester81
Gamester81
35,908 views

3:57

Microvision Review
ReplayRetro
5,181 views

15:00

Rare Milton Bradley Microvision Handheld Review - Gamester81
Gamester81
28,183 views

8:48

Reviews of Every Milton Bradley Microvision Game
Retro Game Living Room
1,525 views

16:14

Magnavox Odyssey System Unboxing video Part 1 of 2
97Retrogamenerd
6,318 views

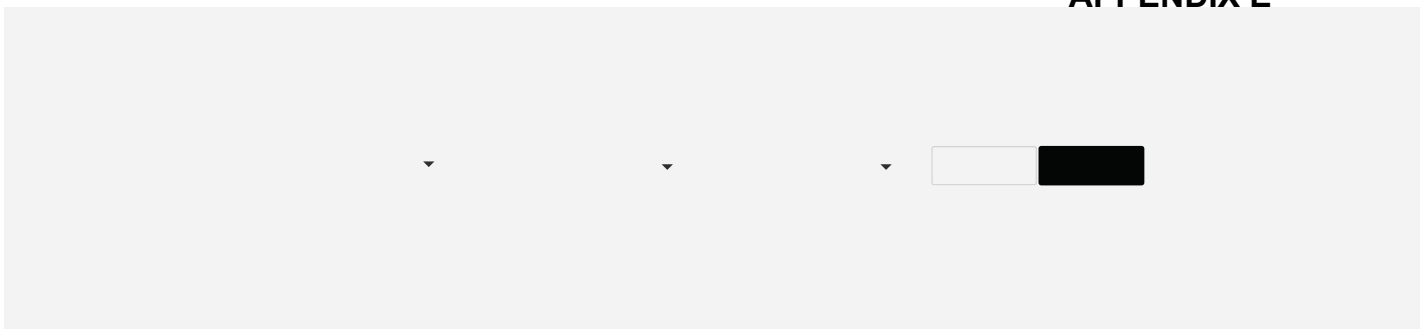
14:48

Is the Intellivision worth playing in 2016? - Console review- Top
Top Hat Gaming Man
11,735 views

11:20

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APPENDIX E



APPENDIX F

www.iTmedia.sk

Nyitólap Katalógus Árlista Nagyker Festék kereső Fórum Akciók Tájékoztató Hírlevél RSS E-mail értesítések

A kosara üres. Ha szeretne beletenni valamit, kattintson a katalógus menüre!

Phoenix Revolution Playstation PS2 Game Controller (IT4022)



Alap kiszerelés: 1 db
Egységár: **2576** HUF
(Törzsvásárlói ár: **2407** HUF, -7%)
E-mail értesítés kérése
a termék érkezésekor

KOSÁRBA:
db
Régóta Elfogyott Termék

Várható szállítási díj egy darab termékre:

ECO csomagponti átvétel (4. kerület Berda József Utca 12) Nyitvatartási Infó!	**Ingyenes**
Budapesti csomagponti átvétel (Podmaniczky utca 43)	150 HUF
Házhozszállítás Budapest területén belül (saját futárral)	472 HUF
Pick-Pack Pont csomagponti átvétel (Vidék)	773 HUF
Házhozszállítás Sprinter futárszolgálattal (2 munkanap, kedvezményes)	1181 HUF

Amennyiben több terméket is rendel, a szállítási díj is tovább csökken arányosan, ez a szállítási díj csak tájékoztató jellegel van feltűntetve! A tényleges szállítási díjért rakja be a termékeket a kosárba majd kattintson a kosárra, a különböző szállítási módok költségeit megtekintheti a rendelés véglegesítése nélkül.
Bővebb információ a szállítási módokról a tájékoztató menüpont alatt található.

Share
Megosztás FACEBOOK-on

Katalógus >Hardver >Gamepad >PS2	
Alap kiszerelés	1
Kartonos kiszerelés	10
Vonalkód	IT4022 5011687741600
Leírás (magyar)	Analog PlayStation 2 vezérlö. Átrendezhetö vezérlökkel! (tetszés szerinti helyre lehet rakni)
Terméknév (angol)	Phoenix Revolution Playstation PS2 Game Controller
Terméknév (magyar)	Phoenix Revolution Playstation PS2 Game Controller
Terméknév	Phoenix Revolution Playstation PS2 Game Controller (IT4022)
EZ A TERMÉK JELENLEG NINCS RAKTÁRON	
Utoljára módosítva:	2010-12-13 17:10

Árlista

Érték	Egységár	Törzsvásárlói Ár
0-6439	2576.00 HUF	2407.00 HUF
6440-12879	2508.00 HUF	2373.00 HUF
12880-25759	2440.00 HUF	2339.00 HUF
25760-64399	2407.00 HUF	2305.00 HUF

Jelmagyarázat*

A termék ára a rendelés összértékétől függően változik.
Amennyiben eléri a megrendelése a kategória limitet, úgy az összes termék esetében automatikusan a kedvezményesebb árat fogja a rendszer számolni!
A törzsváráslói árak (zöld háttérrel jelölt oszlop) tájékoztató jelleggel vannak feltüntetve, ezeket az árakat csak a törzsvásárlói programban való részvételre jogosult vevőink számára nyújtjuk!
Ha szeretne többet megtudni a programról, kattintson a kedvezményes árra vagy a tájékoztató menüpontra.

Képek

APPENDIX F





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APPENDIX F





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APPENDIX F





Szeretné megmutatni másoknak is ezt a terméket? Használja ezt a linket:
http://itmedia.sk/olcso/IT4022/Szerszámok, alkatrészek/Joystick (Game Controller)/Playstation 2/Phoenix_Revolution_Playstation_PS2_Game_Controller

APPENDIX G

EVERTEK Your Discount Distributor — 28 years EVERTEK COMPUTER CORPORATION

30 to 180 Day Financing is now Available with up to $50,000.00 of Inventory
NO CREDIT CHECK REQUIRED FOR PRE-APPROVAL!
BEHALF
† Available to US customers only
Apply Now



INVENTORY ISSUES? We can buy it!
Click here

Help us test our new website (Still in BETA)
Career Opportunities at Evertek.com click here for more information.

New Arrivals | Just in Today! | Just 1 Left | Tablets | Notebooks | Full Inventory | Setup Account | VIEW CART (0)

Search: GO
Join Email List: GO

Gaming
Subcategories
Miscellaneous (1)
Xbox One (2)
Gaming Accessories (4)

All Categories
Systems
Tablets
Desktop PCs
Laptops / Notebooks
Servers / Workstations
Hardware
Adapters / Controllers
Apple Related
Bags / Cases / Backpacks
Blu-Ray / DVD Gear
Cables
Cell Phones / Add-ons
Computer Cases
Consumer Electronics
Cooling Fans
CPUs
Dash Cams / GPS / Auto
Digital Cameras
Digital Media / Readers
Drones / Gadgets / Toys
USB Flash Drives
Gaming
Hard Drives 2.5"
Hard Drives 3.5"
Hard Drive Enclosures
4K / HDTVs
Keyboards
Mice
Media CD / DVD
Memory / RAM
Monitors
Motherboards
MP3 / MP4 Players / iPod
Networking - Wireless
Networking - Wired

Home > Gaming > PS/PS2/PS3

Radica Phoenix Revolution Customizable Gamepad for PS2







Zoom

Sold Out

Login to View Price

New - 90 Days Warranty

Radica Phoenix Revolution Customizable Gamepad for PS2			
Condition	New	Unit Dimensions Are	10.25x7.5x3.75 inches 26.0x19.1x9.5 cm
The Warranty Period Is	90 Days	Each Unit Weighs	1.06 lbs / 0.48 kg
Packaging	Retail Blister Pack	Each Master Box Has	4 Units
Product Number	74160	Master Box Dims Are	10.25x8.25x12 inches 26.0x21.0x30.5 cm
Tech Support By	Dealer	Each Master Box Weighs	5 lbs / 2.27 kg
Support Contact	--	Each Pallet Has	228 Units
Regulatory Approval	N/A	Each Pallet Weighs	292 lbs / 132.45 kg
Country of Origin	China		

RESTOCK REMINDER
THIS PRODUCT IS CURRENTLY UNAVAILABLE
RESTOCK REMINDER CLICK HERE

COMODO EV SSL SITE AUTHENTIC & SECURE
Customers who bought this item also bought:

55 In Stock



Login to View Price

Vizio SmartCast SB3851-D0
38" 5.1-Channel

Customizable Gaming!

The **Radica 74160 Phoenix Revolution** contains unique **interchangeable** modules that enable gamers to completely alter the set up of the controller by repositioning the thumb sticks and action buttons according to their own personal preference. The inclusion of tension sticks also allows players to tighten or loosen the resistance of the sticks by twisting a dial located under each thumb rest, while the invert switch gives the option to invert the up-down movement of the right stick, without changing any in-game settings.

Power Supplies / UPS
Printers / Scanners
Point of Sale
Security / Surveillance
Speakers / Headphones
Tools
Video Cards
Clearance

Designed for use with the Sony Playstation 2, the **Radica 74160** is perfect for any gamer!

Features/Specifications:

- **Radica Phoenix Revolution Customizable Gamepad for PS2**

- **General Features:**
- Completely customizable
- Invert switch switches right and left control
- Adjustable thumbsticks (adjust stiffness of sticks)
- D-pad, button pad and thumbsticks can be put in any location
- 9-foot cord (approximate)
- Eight action buttons offering eight-bit analog control
- Dual analogue joysticks
- Invert Switch
- Two digital action buttons (L3 and R3)
- Two vibration feedback motors
- One eight way analogue directional pad
- Two digital menu navigation buttons (Select and Start)
- Supports analog and digital modes

Package Includes:

- Radica Phoenix Revolution Customizable Gamepad for PS2
- Instruction Manual

Additional Information:

- **Requirements:**
- Playstation 2

- **Notes:**
- UPC: 7 45938 74160 0

Bluetoot ... *more*
Used - 90 Days


2 In Stock

Login to View Price

34" LG 34UM64-P Dual HDMI/DisplayPort/DVI 2560x108 ... *more*
Factory Refurbished - 90 Day Direct


50 In Stock

Login to View Price

Magellan eXplorist 310 2.2" Portable Waterproof GP ... *more*
Factory Refurbished - 90 Day Direct


18 In Stock

Login to View Price

Vizio SmartCast SB3851-D0 38" 5.1-Channel Bluetoot ... *more*
Used - 90 Days


8 In Stock

Login to View Price

29" LG 29UM68-P Dual HDMI/DisplayPort 2560x1080 UI ... *more*
Used - 90 Day Direct

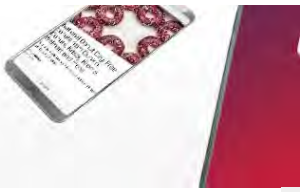
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APPENDIX H

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CULTURE

Saitek's Cyborg Rumble game pad lets you flip the stick

Saitek's Cyborg Rumble game pad lets you change the control pad/analog stick layout between PlayStation and Xbox styles.

BY **WILL GREENWALD** / MARCH 24, 2008 10:06 AM PDT



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Which layout do you prefer on your game pad? Do you like Sony-style, with the left analog stick low and symmetrical with the right analog stick? Or perhaps you prefer Microsoft-style, with the left analog stick high and level with the face buttons. Regardless of your preference, usually that choice is limited to the system you're on or which PC game pad you use.

Saitek has released the Cyborg P3600 Rumble Pad, the first PC game pad we've yet seen that lets you choose between the two layouts on a whim. Instead of a fixed layout, the Cyborg Rumble has the "cyborg module," an analog stick/game-pad component that you can pop out and flip around, depending on whether you want to play PlayStation-style or Xbox-style.

Unfortunately, it's a PC game pad that doesn't play very well with the other consoles, so you're still generally limited to a low stick on your PlayStation controllers and a high stick on your Xbox controllers. Still, if you're kicking it with PC ports (or emulated games), it's great to have the choice. It also comes with the various bells and whistles normally found on USB game pads, including rumble and programmable buttons.

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Review: Saitek Cyborg Rumble Pad P3600

by Kristofer Brozio • October 20, 2007



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With the popularity of console gaming it some find it hard to switch between using the mouse and keyboard or using a gamepad. I myself am one of those people, I have been using the mouse/keyboard combination for so long it's like second nature to me, and when I pick up a gamepad I'm just all confused and it takes quite a while for me to get accustomed to the controls. I'm sure for some, you have the opposite problem I do, those that play console games can't quite master the keyboard/mouse combination and it feels awkward to them.

Saitek has introduced a new addition to their Cyborg line of products, this one is a gamepad that attempts to solve some of these problems, at least for those moving from console to PC gaming. It's aptly named the Cyborg Rumble Pad, obviously it's a rumble pad from the name, but it has a few other features as well.

With the Cyborg Rumble Pad, Saitek has attempted to make a gamepad that it truly compatible with every FPS game out there by the use of a button on the pad labeled FPS, when pressed it automatically programs the pad with the most common FPS game functions.

The pad is like other Saitek pads essentially, but the 'Cyborg' naming comes in with a part of the controller they call the 'Cyborg Module', the left side of the pad features a section that pops out, it includes the analogue stick and the d-pad, the whole thing can be rotated 180 degrees so the user can decide where the stick should be. The Cyborg Rumble Rumble pad has quite a few other features as well, so read on to learn more about them, this is truly a very cool gamepad

Review: Saitek Cyborg Rumble Pad P3600

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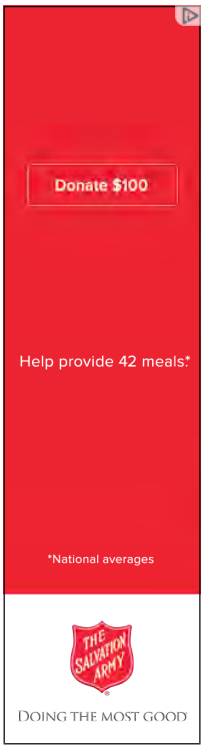
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Reviewed by: Kristofer Brozio

Sponsor: Saitek

Tech Specs,Features or the Basic Info:
Saitek Cyborg Rumble Pad P3600

The PC gamepad has evolved take your gaming to new heights with the most adjustable gamepad in the world!
For a long time, there has been a discussion amongst gamers about which position is best for the left analogue stick on a gamepad. Some prefer the left stick to be level with the right stick, whereas others prefer it offset to the top left corner of the pad.
With the Cyborg Rumble Pad, you now have the choice of either position with the revolutionary Cyborg module (Pat. Pending). At the press of a button, you can remove the Cyborg module from the pad and turn it through 180, instantly changing the configuration of the left stick and d-pad.
The features dont stop there though; you can also program any button on the pad to become a Precision button. Once programmed, pressing this button can affect the sensitivity of either of the analog sticks. Having trouble hitting targets through your sniper rifle when using the analog stick to aim? Hold the Precision button down and the response speed of the stick is reduced, making it much easier to draw a bead on your target.
The Cyborg Rumble Pad also features Saiteks unique FPS button. We realise that many gamers (especially those used to playing on consoles) like to use their gamepads to control first person shooter games, but the majority of these games on PC do not support gamepads. To make the gamepad work in the game you need to program it using the supplied programming software. Whilst this option is still available to you, you can take all the effort out of this by pressing the FPS button on the pad. This instantly programs the pad with the keyboard and mouse commands typically used in these games, meaning you can start playing your games even quicker.
This isnt limited just to FPS games. Instead of being forced to use your keyboard and mouse for certain games, you can use the Saitek Smart Technology software to program any part of the pad with any keyboard or mouse command. This allows you to use the pad in any game, even those that dont support game controllers!
Finally, the Cyborg Rumble Pad also features a driver option called X-Mode. Increasingly, PC games are shipping with support for Microsofts Xbox 360 gamepad and switching the Cyborg Rumble Pad into X-Mode configures it to work in the same way.
{amazon id='B000TCB3XW' align='RIGHT'}
Features:
-Reversible d-pad and left analog stick
-FPS button
-Precision mode function
-2 quick-fire shoulder buttons
-2 analog triggers
-8-way d-pad

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-6 responsive buttons
-2 analog joysticks
-Fully programmable

High quality, varied rumble forces so the gamer feels closer to the action – Using Immersion patented rumble technology for maximum compatibility with supported games.
System Requirement:
Connectivity: USB 2.0
Windows XP, XP64 and Windows Vista (all versions)
***Price**: $34.95*

A Better Look at Things

:

The box for the Saitek Cyborg Rumble Pad has an interesting and attractive futuristic design to it, I like it The front features a nice large picture of the pad itself and an inset showing the Cyborg Module, along with the features listed. The back and sides of the box have the specs and features listed in several languages as well.





Opening the box we find the Cyborg Rumble packed up in bubble wrap for protection, included with the Cyborg Pad is a software/driver disc and brief installation sheet.



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The pad has a layout that is now very familiar to anyone that has ever played any console games, most controllers now have the same layout.



One of the main features of this product is the Cyborg Module that I mentioned in the introduction, it allows the user to truly customize the gamepad to his or her preferences by switching the analog and d-pad positions. This can also be done in game, or hot-swapped without a problem. It essentially just plugs into the controller, the module has one set of pins while the controller has two, depending which side the pins are plugged the pad knows which configuration to use.





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In the center of the gamepad we find the standard Start and Back buttons but we also see the addition of another button labeled FPS. On each side of the FPS buttons are indicators as well, one is a ‘P’ and the other is a cross-hairs.



On the far right we find the X,Y, A, B buttons as well, brightly colored and easily visible.



The right analog joystick is labeled as such, but also labeled in brackets as + Mouse Look. Why it needed to be labeled as such I’m not quite sure, but that’s its default setting.



On the top edge we find the standard shoulder and trigger buttons

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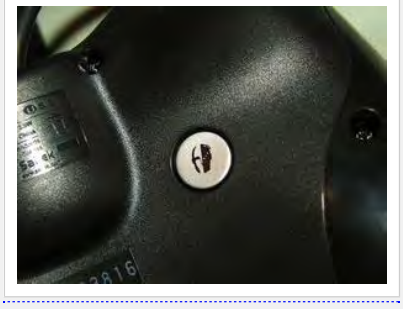


The Saitek Cyborg Rumble Pad is made ergonomically and from my time with it I found it very comfortable to use.



The bottom is fairly plain, with the exception of a small silver button with the picture of a Cyborg head on it. This is used to ‘pop’ the Cyborg Module out of to switch its position.





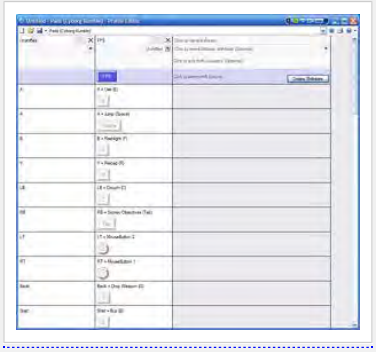
Installation, Testing and Comparison

Installation is very easy, just pop the CD in and setup starts automatically if you have autorun enabled. The program installs essentially two programs for you to use with the Saitek Cyborg Rumble Pad, the SST Programing Software / Profile Editor and the Control Panel, each has it’s own uses obviously.

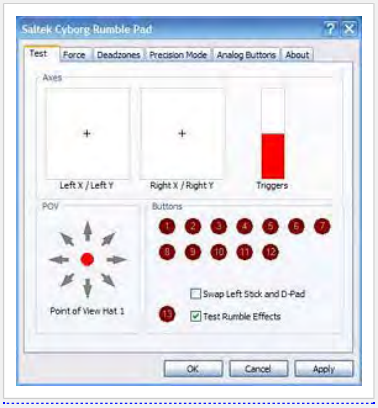
The Profiler software is a bit difficult to use, especially since there is no help documentation included with it. There is a small question mark button

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there but when you click it it opens up a blank nine page PDF file. I thought maybe it was a bug, so I navigated through Start, then Programs to find the Help manual and when I clicked it there it was blank as well. So then I figured maybe it installed wrong, uninstalled everything and did a re-install, still same problem, no help file to be found. You can download a PDF help file about the SST Profiler from the Saitek site but it's not that helpful as it's geared more towards their joysticks, and not the Cyborg Gamepad. It's really not that hard to figure out though, and you only need it if you really want to configure everything, I found that using the controller in FPS mode was fine for me, without changing them.

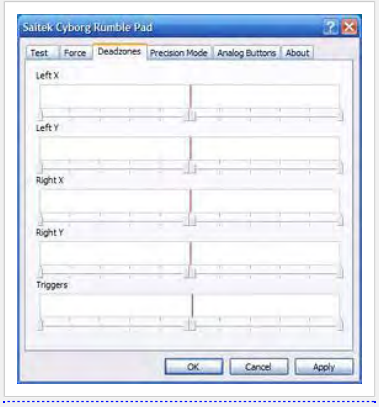


The other program is the Control Panel, which is accessible by right-clicking the gamepad icon that appears in your taskbar when you plug the pad into your USB port. The Control Panel has six screens, or tabs to browse for adjusting settings and testing the controller. From the Control Panel is also where you enable and disable X-Mode, it's located in the 'Analog Buttons' tab, but it would have been nice to have it's own separate tab as I missed it at first, and since it is a special feature of the Cyborg Gamepad it deserves to be highlighted a bit more.

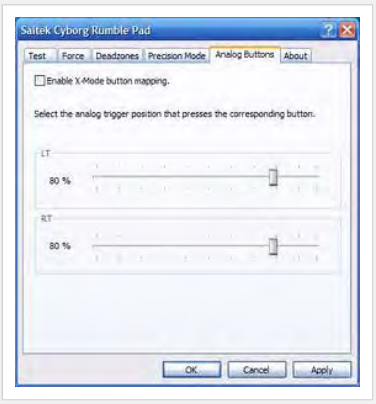


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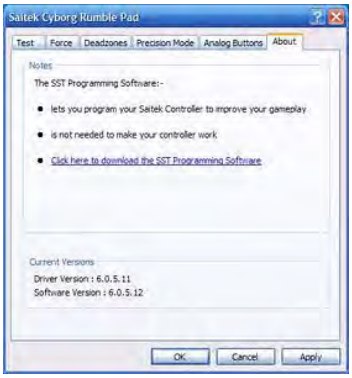






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For testing I tried the Cyborg Rumble Pad out with quite a few games, including Bioshock, BF2142, Halo2 (on Vista), Unreal3 (demo) and F.E.A.R. Perseus Mandate (demo).

When I got the Cyborg Rumble for review I was very curious about this X-Mode they mention that enables the gamepad to be compatible with games that use the Xbox controller. I remembered seeing the option to use the Xbox controller in both Bioshock and Halo2, so I thought they would be perfect for testing, but that didn't happen in Bioshock at all and in Halo2 the controls were a bit funky while in X-Mode. To be specific, in Bioshock the controller was not recognized at all, and in Halo2 the controls were inverted, up was down and down was up, and when I would fire my gun my character would also turn or look left, it made aiming quite difficult

I did email Saitek about this and Sean Lannon from tech support responded with this:

yes, this is a crafty problem as Halo 2 was designed for the Xbox pad, but still worked with others, with the oddity that the axis weren't correct. Games such as BIOSHOCK and more recent games are designed to only work with the Xbox controller.

Our x-mode can only set the pad up with the same assignments and axis setup as the Xbox pad, but the Xbox pad has extra hardware built in that the games look for meaning any other controller can never really work with those games.

However, the FPS button should allow the controllers to work with BIOSHOCK and similar games, although you might need to open the SST programming software to change a few of the keys to the BIOSHOCK setup.

For any help on the programming software, i created some video tutorials on our forum, (link below) which were made using a version of the software older than the software included with those pads, but essentially the principles still work the same .

Here's the links he included in the email, I found them quite useful and you might also:

— Official Site —

www.saitek.com

— Official Forum —

www.saitekforum.com

— Drivers & Software —

http://www.saitek.com/uk/down/drivers.htm

— BETA Drivers & Software —

http://www.saitekforum.com/showthread.php?p=54261#post54261

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— SST Video Tutorials —

http://www.saitekforum.com/showthread.php?t=12097

Of course switching to the FPS mode did solve the problems, and the controller was fine with any game I played actually. If your game doesn't support a gamepad then you'll use the FPS button to essentially force it to, I like this function a lot actually and found it very useful.

Another interesting note about the FPS button is that if you press it while at your desktop, the Cyborg Rumble Pad can be used to control your mouse cursor and will act like your mouse, you can program other buttons as well if you wish to do other things.

Of course to get the most out of the Cyborg Pad you'll need to configure the buttons to your own preferences, and this can be done through the software for FPS mode, or in-game if the game supports it like BF2142 does.

Using it was great, of course it took me quite a bit to get accustomed to, and still think I prefer the mouse/keyboard combination over using a gamepad You just can't teach an old dog new tricks as they say but seriously I found it to work quite well for everything I did while gaming.

I personally found it a bit difficult to control where my character looked, and that includes aiming while using the gamepad, it seems a bit too sensitive to me and I always 'over-looked' where I was aiming or trying to go, but it's not a fault of the pad, it's me actually yes I have a fault or two .

{amazon id='B000TCB3XW' align='RIGHT'}

 and that's where the Precision Mode feature comes in, I like this feature quite a bit. In the control panel you can adjust the sensitivity of Precision Mode in percentages. You assign a button to activate this mode, since I wanted my right analog stick to be more precise I set the button to be the stick button, so that when I pushed in, Precision mode was activated and I didn't have to push another button to do this. It's a great feature that makes targeting much easier, and of course any other precision movements as well.

The Cyborg Module has its uses I guess, but I like my analog sticks to be side-by-side, the right one for looking around and the left for movement and strafing, so that's where they stayed at all times, and I like to use the d-pad for weapons selections. It all depends what your preferences are how you'll arrange the pad, but I can see where it would come in handy for those that like to be able to fully configure their gameplay.

I can't say much about the rumble part of this gamepad as none of the games I tried it with had a rumble feature, it works in the demo in the control panel and it seems like it would be cool, but I was disappointed that none of my games allowed me to use this feature

The Saitek Cyborg Rumble Pad does have a few LEDs in it. There is a red circle around the FPS button that is always on, and when you press the FPS button the cross hairs to the right light up red as well. The Cyborg Module also has two LEDs in it, one red and one green, the Cyborg head will light up to indicate it is plugged in correctly and working, the color is dependent on which side the pad is rotated. There is a also an LED to the left of the FPS button, the 'P' will light up green to indicate you are in 'Precision' mode when activated.

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I personally don't own an Xbox, but Tom was kind enough to take a picture of his controller to use for this review so I can show a side-by-side comparison of the two controllers. You can see the controllers have pretty much the same exact button layout, that is until you flip the Cyborg Module around You can see the Saitek pad is slimmer than the Xbox controller.





Summary:

The Saitek Cyborg Rumble Pad is almost the perfect controller, it's got quite a few features that I'm sure gamers out there will very much appreciate. I for one am very happy I received it for review, it truly is an excellent gamepad, and it lives up to Saiteks' reputation of fine gaming equipment.

The Cyborg could have probably gotten a perfect score, had it not been for a couple problems, the first being the incompatibility with Xbox controllers especially since it is one of the featured points that it is compatible. The

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other would have to be the lack of help documentation for the Profiler software, while it's not a big flaw as you can use the software without it, it just makes things a bit more complicated than it needs to be.
Other than those two problems, I can still recommend the Saitek Cyborg Rumble Pad as it is an excellent gamepad that is truly feature packed. DragonSteelMods gives the Saitek Cyborg Rumble Pad P3600 a 4.5 out of 5 score and our Recommended Award as well.



Pros:
-Comfortable to use
-Easy to use
-FPS button is truly very useful
-Customizable through Cyborg Module and software
-Accurate and sensitive
-Vista compatible out of the box
Cons:
-Instructions are a bit lacking
-Not really compatible with Xbox controllers as advertised, at least in the two games I tried.
I would like to thank Saitek for the chance to review the Cyborg Rumble Pad P3600 and for their support of DSM.
review# 307

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← Review: Kingston DataTraveler Secure 2GB USB Drive

Review: Planon DocuPen RC800 Color Handheld Scanner (DPEN-RC800) →

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VIDEO THE BESTS STEAMED COSPLAY SNACKTAKU HIGHLIGHT REE

Mad Catz's Major League Gaming Controllers Can Change the Way You Play

VIDEO THE STEAMED COSPLAY SNACKTAKU HIGHLIGHT POI



Mike Fahey
8/22/11 9:30pm •

339 Save



With swappable thumb sticks and directional pads, a special compartment for adjusting weight, and a cable that unscrews from the base when not in use, the Mad Catz Official Major League Gaming Pro-Circuit Controller is a serious controller for the serious gamer.

Mad Catz has teamed up with Major League Gaming to create a line of controllers and accessories specifically geared towards big league pro gamers and players that want to feel like them. Gear like the Major League Gaming Arcade FightStick Tournament Edition, the MLG-themed version of the

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controller that Mad Catz releases every time a new fighting game sneezes. It's an excellent controller, but come on, that's just a paint job. We want something new.

Something like the Official Major League Gaming Pro-Circuit Controller.

It's the sort of controller you keep in its own (included) case until it's time to play. The kind of controller you never wrap your cable around when you're done playing — the braided ProCable unscrews for storage and travel. It's the kind of controller with a cartridge-based weight system built-in, giving players the ability to add or remove up to 70 grams of weight.

Most importantly, it's a modular controller. The thumb sticks and d-pads can be swapped about any way the player choses, courtesy of Mad Catz's trademarked ProModule system. Make your Xbox 360 controller feel like a PlayStation 3 controller, or vice versa. Hey, it's okay. Some gamers need to have the d-pad closer to their tongue. Mad Catz plans on selling special d-pad and thumb stick modules separately in a bevy of custom colors, shapes, and textures.

On top of all of that, the Pro-Circuit Controller features removable top and side plates, giving clans, guilds, and teams an easy way to make sure their signature weapons match.

It's the gaming equivalent of bringing custom-made golf clubs to the green, or only bowling with your lucky ball. You walk into the room, unzip the case, screw in the cord; it's like your very own weapons-strapping action movie scene. It probably requires its own theme song. I want one. I might need one.

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The Mad Catz Official Major League Gaming Pro-Circuit Controller ships this year at a price that's likely to be beyond my controller budget. The silly FightStick can be preordered today for $159.99.

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Nintendo, Exhibit 1002
Petitioners NINTENDO CO., LTD., et al.,
Ex. 1036, IPR2023-00643, Pg. 341

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All Apple iPad versions compared

Products > High-Tech > Tablets

Last update 2018 Jan 19 16:48:28

4

Compare Apple iPad Air vs Apple iPad mini with Retina display vs Apple iPad with Retina display vs Apple iPad Mini vs Apple iPad 3 vs Apple iPad 2 vs Apple iPad

You might also be interested by the iPhone comparison:
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	iPad Pro	iPad Pro 9.7"	iPad Air 2	iPad mini 4	iPad Air	iPad Mini with Retina display	iPad with Retina display	iPad Mini	iPad 3	iPad 2	iPad
Video tour											
Connectivity											
Wi-Fi	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n dual band MIMO	802.11a/b/g/n dual band MIMO	802.11a/b/g/n dual band	802.11a/b/g/n dual band	802.11b/g/n	802.11b/g/n	802.11b/g
Bluetooth®	4.2	4.2	4.2	4.2	4.0	4.0	4.0	4.0	4.0	2.1 EDR	2.1 EDR
HDMI port										$39	
USB Host											
NFC											
3G	Cellular model	Cellular model	Cellular model	Cellular model	Cellular model	Cellular model	Cellular model	Cellular model		Cellular model	
4G LTE	Cellular model	Cellular model	Cellular model	Cellular model	Cellular model	Cellular model	Cellular model	Cellular model			
Camera											
Front camera	1.2MP	5MP	1.2MP	1.2MP	1.2MP	1.2MP	1.2 MP	1.2 MP	0.3 MP	0.3 MP	
Rear camera	8MP	12MP	8MP	8MP	5MP	5MP	5 MP	5 MP	5 MP	0.9 MP	
Video recording	1080p	4K	1080p	1080p	1080p	1080p	1080p	1080p		720p	
Technical features											
Processor	Apple A9X	Apple A9X	Apple A8X	Apple A8	Apple A7	Apple A7	Apple A6X	Apple A5	Apple A5X	Apple A5	Apple A4 1Ghz
RAM	4 GB	2 GB	2 GB		1 GB	1 GB	1 GB	512 MB	1,024 MB	512 MB	256 MB
External memory											
Built-in memory	32 GB - 256 GB	32 GB - 256 GB	16 GB - 128 GB	16 GB - 128 GB	16 GB - 128 GB	16 GB - 128 GB	16 GB - 128 GB	16 GB - 64 GB	16 GB - 64 GB	16 GB - 64 GB	16 GB - 64 GB
Screen											
Screen resolution	2732x2048	2048x1536	2048x1536	2048x1536	2048x1536	2048x1536	2048x1536	1024x768	2048x1536	1024x768	1024x768
Pixel density	264 ppi	264 ppi	264 ppi	326 ppi	264 ppi	326 ppi	264 ppi	163 ppi	264 ppi	132 ppi	132 ppi
Screen size	12.9 in	9.7 in	9.7 in	7.9 in	9.7 in	7.9 in	9.7 in	7.9 in	9.7 in	9.7 in	9.7 in
Dimensions											
Height	12.03 in (305.7 mm)	9.44 in (240 mm)	9.44 in (240 mm)	8 in (203.2 mm)	9.44 in (240 mm)	7.87 in (200 mm)	9.49 in (241.2 mm)	7.87 in (200 mm)	9.49 in (241.2 mm)	9.49 in (241.2 mm)	9.55 in (242.8 mm)
Width	8.68 in (220.6 mm)	6.67 in (169.5 mm)	6.67 in (169.5 mm)	5.30 in (134.8 mm)	6.67 in (169.5 mm)	5.30 in (134.7 mm)	7.31 in (185.7 mm)	5.30 in (134.7 mm)	7.31 in (185.7 mm)	7.31 in (185.7 mm)	7.46 in (189.7 mm)

Depth	0.27165 in (6.9 mm)	0.24015 in (6.1 mm)	0.24015 in (6.1 mm)	0.24015 in (6.1 mm)	0.29527 in (7.5 mm)	0.29527 in (7.5 mm)	0.37007 in (9.4 mm)	0.28346 in (7.2 mm)	0.37007 in (9.4 mm)	0.34645 in (8.8 mm)	0.52755 in (13.4 mm)
Weight	25.15 oz (713 g)	15.41 oz (437 g)	15.41 oz (437 g)	10.53 oz (298.8 g)	16.54 oz (469 g)	11.67 oz (331 g)	22.99 oz (652 g)	10.86 oz (308 g)	22.99 oz (652 g)	21.19 oz (601 g)	23.98 oz (680 g)
Battery											
Battery life	10 h	10 h	10 h	10 h	10 h	10 h	10 h	10 h	10 h	10 h	10 h
Replaceable battery	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Sensors											
Accelerometer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ambient light sensor	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gyroscope	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗
eCompass					✓	✓	✓	✓	✓	✓	✗
Barometer	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	
Fingerprint sensor	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗
Images											
Front view											
Top view											
Right view											
Additional											
Operating System	iOS9	iOS9.3	iOS9	iOS9	iOS7	iOS7	iOS 6	iOS 6	iOS 5.1	iOS 4.3	iOS 4.3
SIM card format	Nano-SIM	Nano-SIM + Embedded Apple SIM	Nano-SIM	Nano-SIM	Nano-SIM	Nano-SIM	micro-SIM	nano-SIM	micro-SIM	micro-SIM	micro-SIM
Connector	Lightning	Lightning	Lightning	Lightning	Lightning	Lightning	Lightning	Lightning	30 pin	30 pin	30 pin
Stylus	− 99$	− 99$	✗	✗	✗	✗	✗	✗	✗	✗	✗
Release date	2015 Nov 15	2016 Mar 21	2015 Sep 12	2015 Sep 12	2013 Nov 1	2013 Nov 15	2012 Nov 2	2012 Nov 2	2012 Mar 16	2011 Mar 11	2010 Apr 3
Price	US$799.00	US$599.00	US$499.00	US$399.00	US$399.00	US$279.00		US$299.00		US$399.00	
Colors	Space gray, Silver, Gold	Space gray, Silver, Gold, Rose gold	Space gray, Silver, Gold	Space gray, Silver, Gold	Space gray, Silver	Space gray, Silver	Black, White	Black, White	Black, White	Black, White	Black
Name	Apple iPad Pro	Apple iPad Pro 9.7inch	Apple iPad Air 2	Apple iPad mini 4	Apple iPad Air	Apple iPad Mini with Retina display	Apple iPad 4 with Retina display	Apple iPad Mini	Apple iPad 3	Apple iPad 2	Apple iPad
Website	apple.com/...	apple.com/...	a[redacted]	apple.com/...	apple.com/...	apple.com/...	apple.com/...	apple.com/... [redacted]	apple.com/...	apple.com/...	apple.com/...

[redacted] Embed [redacted] Save new view [redacted]

Creator [redacted] 2012-10-25 09:05:19

Last contributor [redacted] 2018-01-19 16:48:28

Category Tablets

Default language

Excerpt



Compare Apple iPad Air vs Apple iPad mini with Retina display vs Apple iPad with Retina display vs Apple iPad Mini vs Apple iPad 3 vs Apple iPad 2 vs Apple iPad

Sources

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Comments

Newbie to the site, how do I request or upload newer information for iPad Pro using A10X Fusion chip ?

*Posted 2018-04-23 16:36:11 by **CANDUDE***

voted for this Comparison (Like)

*Posted 2017-10-28 16:09:23 by **toesinthesand***

voted for this Comparison (Like)

*Posted 2016-11-01 21:56:48 by **Alexis***

voted for this Comparison (Like)
bravo

*Posted 2016-05-24 18:36:03 by **Averroes Hammami***

rated Apple iPad 4 with Retina display: Overall rating

*Posted 2013-09-25 04:36:32 by **Yoo Jung Lee***

voted for Apple iPad 4 with Retina display (Like)

*Posted 2013-09-25 04:36:08 by **Yoo Jung Lee***

voted for this Comparison (Like)

*Posted 2012-10-25 09:59:49 by **Seralo***

voted for Apple iPad 2 (Like)
Awesome !

*Posted 2012-02-26 17:05:27 by **YS Bae***

voted for Apple iPad 2 (Like)
iPad is great. Especially for the apps.

More comparisons

Cấu hình PI E005

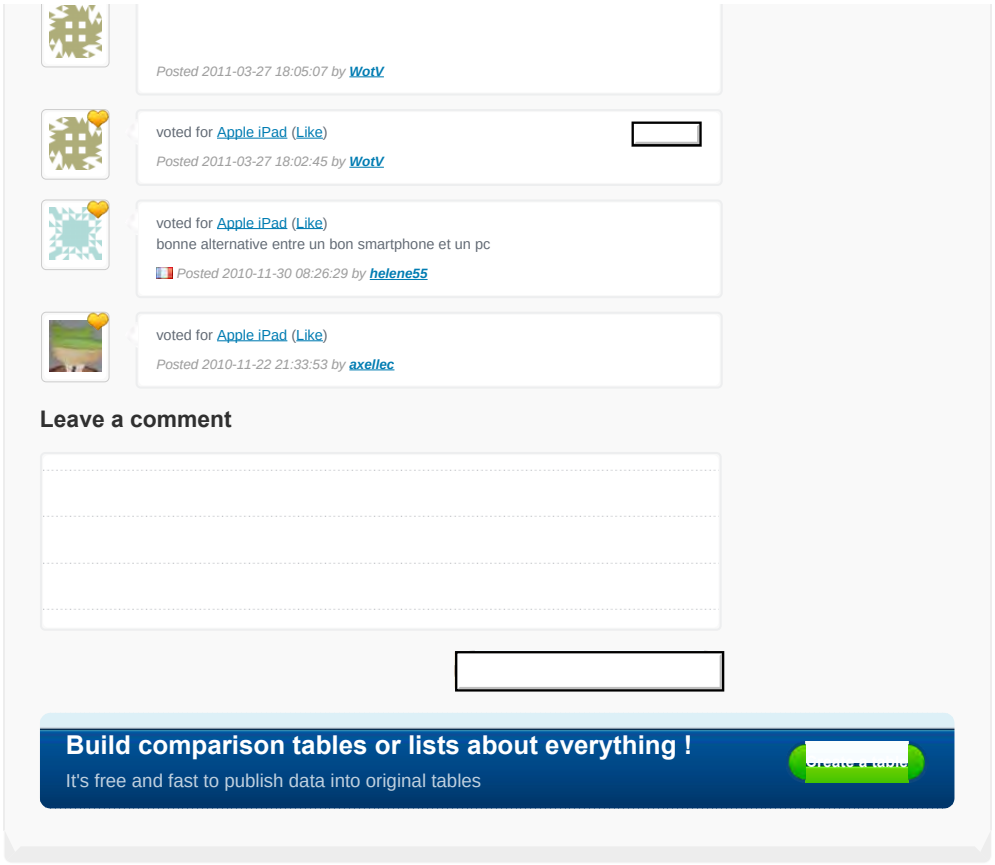
Google new Nexus 7 vs Apple iPad mini

Kindle Fire vs iPad



Comparison of Google Nexus devices tablets and phones

Samsung 10.1 tablets



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APPENDIX P

Dow posts biggest jump since April after US and China say trade talks to resume

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TECH GUIDE

Here's every iPhone released, in order, and what changed along the way

- The original iPhone went on sale 10 years ago today
- Here's a list of every iPhone that has launched since then
- The next iPhone is expected in September

Todd Haselton | @robotodd

Published 1:29 PM ET Thu, 29 June 2017

CNBC



Thursday marks the 10th anniversary of the day Apple released the very first iPhone. CNBC already covered a bit of how the iPhone has changed since the original launched, but we also wanted to take a trip down memory lane.

Here's a list of every single iPhone Apple has launched since the original made its debut ten years ago. As a reminder, Apple's next iPhone, rumored to be called the iPhone 8, is expected to launch in September.

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Other rumors have suggested it may be called the iPhone X to celebrate the 10th year.

Without further ado and beginning with the device that changed it all:

The original iPhone



Apple

The original iPhone changed the world forever in 2007. Its multitouch screen and digital keyboard were highlights.

iPhone 3G



Apple

Apple upgraded the original iPhone in 2008 with a complete redesign and support for 3G networks finally allowing users to download files and surf the web faster.

iPhone 3GS

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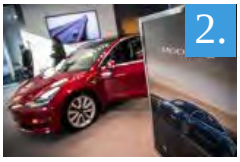
Cryptocurrency investor robbed via his cellphone account sues AT&T for $224 million over loss

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Tesla ex-security



Apple

The iPhone 3GS, launched in 2009, had an S for "speed." It featured a faster processor than its predecessor and was able to cruise on even faster 3G networks that were beginning to approach 4G speeds.

iPhone 4



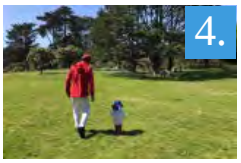
Apple

The iPhone 4, launched in 2010, introduced yet another redesign, this time with a glass body. It's the first time Apple included its sharp "Retina Display" and support for FaceTime. It's also the phone that made headlines for "antennagate" because cell service dropped if you held it the wrong way.

iPhone 4s



employee alleges theft, spying and drug dealing at company



Here's how a family of 3 gets by in San Francisco without anyone working a job



Trader bets on Nvidia pullback on earnings – but would buy it anyway



Apple

The iPhone 4S made its debut in 2011. This time the S didn't stand for speed, but rather for "Siri," Apple's brand new voice assistant. The iPhone 4 featured better cameras, too.

iPhone 5



Apple

With the iPhone 5, launched in 2012, Apple once again shifted the design of its iPhones. It changed from a 30-pin charging port to the current Lightning port. It also added LTE support for new 4G networks.

iPhone 5s



Apple

The iPhone 5s launched in 2013 and was the first iPhone to support Touch ID, Apple's fingerprint reader technology, and a new M7 motion processor that allowed users to track their steps throughout the day.

iPhone 5c



Apple

The iPhone 5C was also introduced in 2013 and was marketed as Apple's fun and more affordable iPhone with a plastic shell. It didn't offer as much storage as the other iPhones and also didn't have Touch ID.

iPhone 6 and iPhone 6 Plus

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Ex. 1036, IPR2023-00643, Pg. 350



Apple

Apple launched the iPhone 6 and iPhone 6 Plus in 2014. The latter was Apple's first foray into a "phablet" or large-screened smartphone. Both were the first devices to support Apple Pay. The iPhone 6 Plus had a more advanced camera with optical image stabilization to help users take better pictures, too. Some users complained of iPhone 6 and iPhone 6 Plus units "bending" when they launched.

iPhone 6s and iPhone 6s Plus



Apple

The iPhone 6s and iPhone 6s Plus were introduced in 2015. They were the first phones to support LTE-Advanced networks and also Apple's new 3D Touch displays, which allowed users to press into the screen a bit more to find additional menu information. Apple made these phones stronger to prevent bending concerns from the iPhone 6 and iPhone 6 Plus.

iPhone SE

Nintendo, Exhibit 1002
Petitioners NINTENDO CO., LTD., et al.,
Ex. 1036, IPR2023-00643, Pg. 351



Apple

In an attempt to cater to folks who still preferred Apple's smaller screens, which Apple ditched with the iPhone 5, Apple introduced the iPhone SE in 2016. It offered most flagship features, just with a smaller 4-inch screen.

iPhone 7 and iPhone 7 Plus



Apple

Finally we're up to the current models, the iPhone 7 and iPhone 7 Plus. They maintain the design introduced with the iPhone 6 and carried through the iPhone 6s, marking the first time Apple didn't change the iPhone body after two years. The iPhone 7 Plus has an advanced dual-camera system for Apple's "Portrait" photos. Both phones ditched the headphone jack and were introduced in new jet black, matte black and, more recently, red colors. The devices are water resistant and feature the most advanced processors Apple has ever included in its phones.



Todd Haselton
Technology Product Editor

APPENDIX P

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APPENDIX P

Data is a real-time snapshot *Data is delayed at least 15 minutes. Global Business and Financial News, Stock Quotes, and Market Data and Analysis.

Data also provided by



APPENDIX Q

List of iPads

This page is about the full-sized (9.7, 10.5, and 12.9") iPad. For the smaller (7.9") iPad, see List of iPad minis.

There are ten iterations of the iPad.

Contents

iPad

iPad 2

iPad (3rd generation)

iPad (4th generation)

iPad Air

iPad Air 2

iPad Pro

iPad Pro (12.9-inch)

iPad Pro (9.7-inch)

iPad (5th generation)

iPad Pro (12.9-inch, 2nd generation)

iPad Pro (10.5-inch)

iPad (6th generation)

References

iPad

This is the very first iPad.



- Colors: Black
- Battery Specs:
  - Current: 6600 mA
  - Power: 24.8 Wh
  - Voltage: 3.76 V
- Cellular Radio: Up to HSDPA (3.5G), Cellular model only
- CPU Specs:
  - Core Design: ARM Cortex-A8 x 1
  - CPU: S5L8930 "A4"
  - CPU Speed: 1 GHz

Nintendo, Exhibit 1002
Petitioners NINTENDO CO., LTD., et al.,
Ex. 1036, IPR2023-00643, Pg. 355

APPENDIX Q

    - Instruction Set: ARMv7
- Firmware:
    - Initial firmware: 3.2 (7B367)
    - Latest firmware: 5.1.1 (9B206)
- Internal Name: iPad1,1
- RAM: 256 MB
- Storage: 16/32/64 GB

iPad 2



- Colors: Black/White
- Battery Specs:
    - Current: 6930 mA
    - Power: 25 Wh
    - Voltage: 3.8 V
- Camera Specs:
    - Rear: 0.75 megapixels
- Cellular Radio:
    - iPad2,2: Up to HSDPA/HSUPA (3.5G)
    - iPad2,3: Up to EV-DO Rev. A (3.5G)
- CPU Specs:
    - Core Design: ARM Cortex-A9 x 2
    - CPU: S5L8940 "A5"
    - CPU Speed: 1 GHz
    - Instruction Set: ARMv7
- Firmware:
    - Initial firmware: 4.3 (8F191), 4.3 (8F191), 4.3 (8F191), 5.1 (9B176)
    - Latest publicly available firmware: 9.3.5 (13G36), 9.3.5 (13G36), 9.3.5 (13G36), 9.3.5 (13G36)
    - Latest firmware: 9.3.5 (13G36), 9.3.5 (13G36), 9.3.5 (13G36), 9.3.5 (13G36)
- Internal Name: iPad2,1, iPad2,2, iPad2,3, iPad2,4
- RAM: 512 MB
- Storage: 16/32/64 GB (Only 16GB for iPad2,4)

iPad (3rd generation)

- Colors: Black/White
- Battery Specs:
    - Current: 11560 mA
    - Power: 42.5 Wh
    - Voltage: 3.78 V
- Camera Specs:

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APPENDIX Q



- Rear: 5 megapixels
- Cellular Radio:
  - iPad3,2: Up to LTE (Band 13) (4G)
  - iPad3,3: Up to LTE (Bands 4, 17) (4G)
- CPU Specs:
  - Core Design: Apple Swift x 2
  - CPU: S5L8945 "A5X"
  - CPU Speed: 1 GHz
  - Instruction Set: ARMv7
- Firmware:
  - Initial firmware: 5.1 (9B176), 5.1 (9B176), 5.1 (9B176)
  - Latest publicly available firmware: 9.3.5 (13G36), 9.3.5 (13G36), 9.3.5 (13G36)
  - Latest firmware: 9.3.5 (13G36), 9.3.5 (13G36), 9.3.5 (13G36)
- Internal Name: iPad3,1, iPad3,2, iPad3,3
- RAM: 1 GB
- Storage: 16/32/64 GB

iPad (4th generation)



- Colors: Black/White
- Battery Specs:
  - Current: 11560 mA
  - Power: 42.5 Wh
  - Voltage: 3.78 V
- Camera Specs:
  - Rear: 5 megapixels
- Cellular Radio:
  - iPad3,5: Up to LTE (Bands 4, 17) (4G)
  - iPad3,6: Up to LTE (Bands 1, 3, 5, 13, 25) (4G)
- CPU Specs:
  - Core Design: Apple Swift x 2
  - CPU: S5L8955 "A6X"
  - CPU Speed: 1.4 GHz
  - Instruction Set: ARMv7
- Firmware:
  - Initial firmware: 6.0 (10A407), 6.0.1 (10A8426), 6.0.1 (10A8426)
  - Latest publicly available firmware: 10.3.3 (14G60), 10.3.3 (14G60), 10.3.3 (14G60)
  - Latest firmware: 10.3.3 (14G60), 10.3.3 (14G60), 10.3.3 (14G60)
- Internal Name: iPad3,4, iPad3,5, iPad3,6
- RAM: 1 GB

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APPENDIX Q

- Storage: 16/32/64/128 GB

iPad Air



- Colors: Silver/Space Gray
- Battery Specs:
  - Current: 8820 mA
  - Power: 32.9 Wh
  - Voltage: 3.73 V
- Camera Specs:
  - Rear: 5 megapixels
- Cellular Radio:
  - iPad4,2: Up to LTE (Bands 1, 2, 3, 4, 5, 7, 8, 13, 17, 18, 19, 20, 25, 26) (4G)
  - iPad4,3: Up to LTE (Bands 1, 2, 3, 5, 7, 8, 18, 19, 20, 38, 39, 40) (4G)
- CPU Specs:
  - Core Design: Apple Cyclone x 2
  - CPU: S5L8965 "A7 Rev A"
  - CPU Speed: 1.4 GHz
  - Instruction Set: ARMv8
- Firmware:
  - Initial firmware: 7.0.3 (11B511), 7.0.3 (11B511), 7.1 (11D167)
  - Latest publicly available firmware: 11.4.1 (15G77), 11.4.1 (15G77), 11.4.1 (15G77)
  - Latest firmware: 12.0 beta 8 (16A5357b), 12.0 beta 8 (16A5357b), 12.0 beta 8 (16A5357b)
- Internal Name: iPad4,1, iPad4,2, iPad4,3
- RAM: 1 GB
- Storage: 16/32/64/128 GB

iPad Air 2



- Colors: Gold/Silver/Space Gray
- Battery Specs:
  - Current: 7340 mA
  - Power: 27.62 Wh
  - Voltage: 3.763 V
- Camera Specs:
  - Rear: 8 megapixels
- Cellular Radio:
  - iPad4,2: Up to LTE (Bands 1, 2, 3, 4, 5, 7, 8, 13, 17, 18, 19, 20, 25, 26, 28, 29, 38, 39, 40, 41) (4G)
- CPU Specs:
  - Core Design: Apple Typhoon x 2

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APPENDIX Q

- CPU: T7001 "A8X"
- CPU Speed: 1.5 GHz
- Instruction Set: ARMv8

- Firmware:
  - Initial firmware: 8.1 (12B410), 8.1 (12B410)
  - Latest publicly available firmware: 11.4.1 (15G77), 11.4.1 (15G77)
  - Latest firmware: 12.0 beta 8 (16A5357b), 12.0 beta 8 (16A5357b)
- Internal Name: iPad5,3, iPad5,4
- RAM: 2 GB
- Storage: 16/64/128 GB

iPad Pro

iPad Pro (12.9-inch)



- Colors: Gold/Silver/Space Gray
- Battery Specs:
  - Current: 10307 mA
  - Power: 38.8 Wh
  - Voltage: 3.77 V
- Camera Specs:
  - Rear: 8 megapixels
- Cellular Radio:
  - iPad6,8: Up to LTE (Bands 1, 2, 3, 4, 5, 7, 8, 13, 17, 18, 19, 20, 25, 26, 28, 29, 38, 39, 40, 41) (4G)
- CPU Specs:
  - Core Design: Apple Twister x 2
  - CPU: S8001 "A9X"
  - CPU Speed: 2.24 GHz
  - Instruction Set: ARMv8-A
- Firmware:
  - Initial firmware: 9.1 (13B143), 9.1 (13B143)
  - Latest publicly available firmware: 11.4.1 (15G77), 11.4.1 (15G77)
  - Latest firmware: 12.0 beta 8 (16A5357b), 12.0 beta 8 (16A5357b)
- Internal Name: iPad6,7, iPad6,8
- RAM: 4 GB
- Storage: 32/128/256 GB

iPad Pro (9.7-inch)

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Petitioners NINTENDO CO., LTD., et al.,
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APPENDIX Q



- Colors: Gold/Silver/Space Gray/Rose Gold
- Battery Specs:
  - Current: 7306 mA
  - Power: 27.91 Wh
  - Voltage: 3.82 V
- Camera Specs:
  - Rear: 12 megapixels
- Cellular Radio:
  - iPad6,4: Up to LTE (Bands 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 18, 19, 20, 25, 26, 27, 28, 29, 30, 38, 39, 40, 41) (4G)
- CPU Specs:
  - Core Design: Apple Twister x 2
  - CPU: S8001 "A9X"
  - CPU Speed: 2.16 GHz
  - Instruction Set: ARMv8-A
- Firmware:
  - Initial firmware: 9.3 (13E234), 9.3 (13E234)
  - Latest publicly available firmware: 11.4.1 (15G77), 11.4.1 (15G77)
  - Latest firmware: 12.0 beta 8 (16A5357b), 12.0 beta 8 (16A5357b)
- Internal Name: iPad6,3, iPad6,4
- RAM: 2 GB
- Storage: 32/128/256 GB

iPad (5th generation)



- Colors: Gold/Silver/Space Gray
- Battery Specs:
  - Current: 8820 mA
  - Power: 32.9 Wh
  - Voltage: 3.73 V
- Camera Specs:
  - Rear: 8 megapixels
- Cellular Radio:
  - iPad6,12: Up to LTE (Bands 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28, 29, 38, 39, 40, 41) (4G)
- CPU Specs:
  - Core Design: Apple Twister x 2
  - CPU: S8000
  - CPU Speed: 1.85 GHz
  - Instruction Set: ARMv8

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APPENDIX Q

- Firmware:
  - Initial firmware: 10.3 (14E277), 10.3 (14E277)
  - Latest publicly available firmware: 11.4.1 (15G77), 11.4.1 (15G77)
  - Latest firmware: 12.0 beta 8 (16A5357b), 12.0 beta 8 (16A5357b)
- Internal Name: iPad6,11, iPad6,12
- RAM: 2 GB
- Storage: 32/128 GB

iPad Pro (12.9-inch, 2nd generation)



- Colors: Gold/Silver/Space Gray
- Battery Specs:
  - Current: ? mA
  - Power: 41 Wh
  - Voltage: ? V
- Camera Specs:
  - Rear: 12 megapixels
- Cellular Radio:
  - iPad7,2: Up to LTE (Bands 1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 17, 18, 19, 20, 21, 25, 26, 27, 28, 29, 30, 38, 39, 40, 41) (4G)
- CPU Specs:
  - Core Design: Apple Hurricane x 3 & Apple Zephyr x 3
  - CPU: T8011 "A10X"
  - CPU Speed: 2.38 GHz
  - Instruction Set: ARMv8
- Firmware:
  - Initial firmware: 10.3.2 (14F8089), 10.3.2 (14F8089)
  - Latest publicly available firmware: 11.4.1 (15G77), 11.4.1 (15G77)
  - Latest firmware: 12.0 beta 8 (16A5357b), 12.0 beta 8 (16A5357b)
- Internal Name: iPad7,1, iPad7,2
- RAM: 4 GB
- Storage: 64/256/512 GB

iPad Pro (10.5-inch)

- Colors: Gold/Silver/Space Gray/Rose Gold
- Battery Specs:
  - Current: 8134 mA
  - Power: 30.8 Wh
  - Voltage: 3.77 V

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- Camera Specs:
  - Rear: 12 megapixels
- Cellular Radio:
  - iPad7,4: Up to LTE (Bands 1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 17, 18, 19, 20, 21, 25, 26, 27, 28, 29, 30, 38, 39, 40, 41) (4G)
- CPU Specs:
  - Core Design: Apple Hurricane x 3 & Apple Zephyr x 3
  - CPU: T8011 "A10X"
  - CPU Speed: 2.38 GHz
  - Instruction Set: ARMv8
- Firmware:
  - Initial firmware: 10.3.2 (14F8089), 10.3.2 (14F8089)
  - Latest publicly available firmware: 11.4.1 (15G77), 11.4.1 (15G77)
  - Latest firmware: 12.0 beta 8 (16A5357b), 12.0 beta 8 (16A5357b)
- Internal Name: iPad7,3, iPad7,4
- RAM: 4 GB
- Storage: 64/256/512 GB

iPad (6th generation)

- Colors: Gold/Silver/Space Gray
- Battery Specs:
  - Current: 8820 mA
  - Power: 32.9 Wh
  - Voltage: 3.73 V
- Camera Specs:
  - Rear: 8 megapixels
- Cellular Radio:
  - iPad7,6: Up to LTE (Bands 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28, 29, 38, 39, 40, 41) (4G)
- CPU Specs:
  - Core Design: Apple Fusion x 2
  - CPU: T8010 "A10"
  - CPU Speed: 2.31 GHz
  - Instruction Set: ARMv8
- Firmware:
  - Initial firmware: 11.3 (15E216), 11.3 (15E218)
  - Latest publicly available firmware: 11.4.1 (15G77), 11.4.1 (15G77)
  - Latest firmware: 12.0 beta 8 (16A5357b), 12.0 beta 8 (16A5357b)
- Internal Name: iPad7,5, iPad7,6
- RAM: 2 GB

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- Storage: 32/128 GB

References

- Keynote
- Apple.com (http://www.apple.com/ipad)
- Various Wikipedia articles

Retrieved from "https://www.theiphonewiki.com/w/index.php?title=List_of_iPads&oldid=68561"

This page was last edited on 3 April 2018, at 13:29.

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APPENDIX R

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WHY EVERYTHING WIRELESS IS 2.4 GHZ



GIZMODO

By John Herman

You live your life at 2.4 GHz. Your router, your cordless phone, your Bluetooth earpiece, your baby monitor and your garage opener all love and live on this radio frequency, and no others. Why? The answer is in your kitchen.

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APPENDIX R

What We're Talking About ——————————

Before we charge too far ahead here, let's run over the basics. Your house or apartment, or the coffee shop you're sitting in now, is saturated with radio waves. Inconceivable numbers of them, in fact, vibrating forth from radio stations, TV stations, cellular towers, and the universe itself, into the space you inhabit. You're being bombarded, constantly, with electromagnetic waves of all kind of frequencies, many of which have been encoded with specific information, whether it be a voice, a tone, or digital data. Hell, maybe even these very words.

On top of that, you're surrounded by waves of your own creation. Inside your home are a dozen tiny little radio stations: your router, your cordless phone, your garage door opener. Anything you own that's wireless, more or less. Friggin' radio waves: they're everywhere.



Really, it's odd that your cordless phone even has that 2.4-GHz sticker. To your average, not-so-technically-inclined shopper, it's a number that means A) nothing, or B) something, but the wrong thing. ("2.4 GHz? That's faster than my computer!")

What that number actually signifies is broadcast frequency, or the

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frequency of the waves that the phone's base station sends to its handset. That's it. In fact, the hertz itself just just a unit for frequency in any context: it's the number of times that something happens over the course of a second. In wireless communications, it refers to wave oscillation. In computers, it refers to processor clock rates. For TVs, the rate at which the screen refreshes; for me, clapping in front of my computer right now, it's the rate at which I'm doing so. One hertz, slow clap.

The question, then, is why so many of your gadgets operate at 2.4 GHz, instead of the ~2,399,999,999 whole number frequencies below it, or any number above it. It seems almost controlled, or guided. It seems, maybe, a bit arbitrary. It seems, well, regulated.

A glance at FCC regulations confirms any suspicions. A band of frequencies clustered around 2.4 GHz has been designated, along with a handful of others, as the Industrial, Scientific, and Medical radio bands. "A lot of the unlicensed stuff — for example, Wi-Fi — is on the 2.4-GHz or the 900-Mhz frequencies, the ISM bands. You don't need a license to operate on them." That's Ira Kelpz, Deputy Chief, Office of Engineering and Technology at the Federal Communications Commission, explaining precisely why these ISM bands are attractive to gadget makers: They're free to use. If routers and cordless phones and whatever else are relegated to a small band 2.4 GHz, then their radio waves won't interfere with, say, cellphones operating at 1.9 GHz, or AM radio, which broadcasts between 535 kHz and 1.7 MHz. The ISM is, in effect, a ghetto for unlicensed wireless transmission, recommended first by a quiet little agency in a Swiss office of the UN, called the ITU, then formalized, modified and codified for practical use by the governments of the world, including, of course, our own FCC.

The current ISM standards were established in 1985, and just in time. Our phones were one the cusp of losing their cords, and in the near future, broadband internet connections would come into existence and become magically wireless. All these gadgets needed

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frequencies that didn't require licenses, but which were nestled between the ones that did. Frequencies that weren't so high that they sacrificed broadcast penetration (through walls, for example), but weren't so low that they required foot-long antennae. In short, they needed the ISM bands. So they took them.

Why 2.4? ——–



Now, there are many, many frequencies that qualify as "unlicensed," but only a handful get used in our phones, routers, and walkie talkies.

In the case of something like phones, which are sold paired with a specific base station, choosing the right unlicensed frequency is a pretty straightforward calculation: A 900-MHz system will be more easily able to broadcast through a multifloor house, but a 2.4-GHz system will have a longer range (if unobstructed) and generally requires a smaller antenna, which keeps the phone's size in check.

Wi-Fi routers started as proprietary, paired systems operating on all manner of frequencies, only settling on a standard — 5 GHz — with the codification of 802.11a. Then the Institute of Electrical and Electronics Engineers agreed that 2.4 GHz, with its wide channel selection and range/penetration/cost potential, was a safer bet. Today, some Wireless N routers can operate on both 2.4 GHz and 5 GHz bands concurrently. Routers could function just as well at 2.3 or 2.5 GHz, but they're not allowed. It's the rules. The 2.4 GHz

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band, which runs from about 2,400 to 2,483.5 Mhz, is where routers have to live.

For this, they can thank the microwave.

Microwave ovens heat food by blasting it with, literally, microwaves. (It bears mentioning that in terms of electromagnetic waves, microwaves, the wavelengths of which range from a millimeter all the way up to a meter, aren't particularly "micro".) At certain frequencies, such waves cause something call Dielectric Heating in water and fat, while passing straight through other materials, like plastic or glass, without exciting them much at all. (Metal, on the other hand, gets too excited.) For a full explanation of how dielectric heating works, click here, but for the purposes of this article, just know this: Only certain materials are susceptible, and only when bombarded with waves of a certain frequency and power. One of those frequencies is 915 MHz. Others fall at 5.8 GHz and 24 GHz. But the one that proved to be both effective and relatively cheap to achieve was 2.45 GHz. That's the frequency emitted by your microwave, right there in the kitchen.



So, when the FCC got around to establish just which frequencies unlicensed gadgets could broadcast on, they had a lot of things to think about. First, they had to consider which frequencies were already in use by stuff like radio and TV. Those would be off-limits. Then, of the remaining, usable, unallocated frequencies, they sought out the ones that were already being used by existing equipment. One thing they noticed? Microwaves were popular!

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They'd been around commercially since 1947. And generally, they operated at a specific frequency: 2.45 GHz. Despite heavy shielding, microwave ovens' powerful emissions could sometimes interfere with neighboring frequencies, so it was decided that they should be given a few megahertz of space in both directions. And so the 2,400-to-2,483.5-Mhz ISM bandwas born.

That these free-for-all frequencies could one day get overcrowded was always a possibility. But the FCC's primary concern is minding the frequencies it licenses; everyone working in ISM frequencies, then, must fend for themselves. And they do! Your microwave and your router might emit waves in the same frequency range, and this might screw with your router's connectivity a little bit. Generally, though, the router companies have been able to minimize interference by boosting signal strength and writing more intelligent firmware. And outward emissions of microwaves are at least supposed to be minimized. (That perforated metal shield in the glass door of your microwave? It's a shield — the holes in it are smaller than the physical width of the 2.4-GHz wave.) In the end, things work.

That's not to say that the 2.4-GHz band isn't getting crowded. Many routers operate at least in part on the 5-GHz band, and a quick survey of your local Best Buy will find wireless phones at 900 MHz, 1.9 GHz and 5 GHz. But the King of Frequency mountain, the band loved by billions of wireless connections around the world, be they Bluetooth, Wi-Fi, or nonstandard RF remotes, is my band, your band, our band, 2.4. And all because we wanted to cook our food a little faster.

Original art by guest artist Chris McVeigh (AKA powerpig). You can catch all his work at flickr.com/powerpig, and follow him on Twitter. (@Actionfigured)

Still something you wanna know? Send questions about That Thing That Doesn't Make Sense here, with "Giz Explains" in the subject

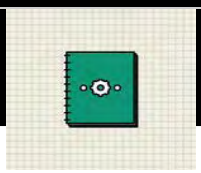
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Send an email to John Herrman, the author of this post, at jherrman@gizmodo.com.

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APPENDIX R

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APPENDIX S

Lifewire

An Overview of a Personal Area Network (PAN)

PANs and WPANs Consist of Personal, Nearby Devices

by **Bradley Mitchell**

39

Updated February 16, 2018

A personal area network (PAN) is a computer network organized around an individual person, and that's set up for personal use only. They typically involve a computer, phone, printer, tablet and/or some other personal device like a PDA.

The reason PANs are classified apart from other network types like LANs, WLANs, WANs and MANs is because the idea is to transmit information between devices that are nearby instead of sending that same data through a LAN or WAN before it reaches something that's already within reach.

You can use these networks to transfer files including email, calendar appointments, photos, and music. If the transfers are done over a wireless network, it's technically called a WPAN, which is a *wireless* personal area network.

Technologies Used to Build a PAN

Personal area networks can be wireless or constructed with cables. USB and FireWire often link together a wired PAN, while WPANs typically use Bluetooth (and are called piconets) or sometimes infrared connections.

Here's an example: A Bluetooth keyboard connects to a tablet to control the interface that's able to reach a nearby smart light bulb.

Also, a printer in a small office or home that connects to a nearby desktop, laptop or phone is considered to exist within a PAN. The same is true for keyboards and other devices that use IrDA (Infrared Data Association).

Theoretically, a PAN might also consist of small, wearable or embedded devices that can communicate upon nearby contact with other wireless devices. A chip inserted beneath the skin

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of a finger, for example, that can store your medical data, can connect with a device to transmit your information to a doctor.

How Big Is a PAN?

Wireless personal area networks generally cover a range of a few centimeters up to around 10 meters (33 feet). These networks can be viewed as a special type (or subset) of local area networks that support one person instead of a group.

A master-slave device relationship can take place in a PAN where a number of devices connect to the "main" device called the master. The slaves relay data through the master device. With Bluetooth, such a setup could be as large as 100 meters (330 feet).

Although PANs are, by definition, personal, they can still access the internet under certain conditions. For example, a device within a PAN can be connected to a LAN which has access to the internet, which is a WAN. In order, each network type is smaller than the next, but all of them can ultimately be intimately connected.

Benefits of a Personal Area Network

PANs are for personal use, so the benefits might be more easily understood than when talking about wide area networks, for example, that describe the internet. With a personal area network, your own personal devices can interconnect for easier communication.

For instance, a surgery room in a hospital might have its own PAN set up so that the surgeon can communicate with the other team members in the room. It's unnecessary to have all their communication fed through a larger network only to be received by people a few feet away. A PAN takes care of this through short-range communication such as Bluetooth.

Another example briefly mentioned above is with a wireless keyboard or even a mouse. They don't need to operate computers in other buildings or cities, so they're instead built to just communicate with a nearby, usually line-of-sight device like a computer or tablet.

Since most devices that support short-range communication can block out connections that aren't pre-authorized, a WPAN is considered a secure network. However, just like with WLANs and other network types, a personal area network is just as easily accessible to nearby hackers.

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APPENDIX T

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Dictionary

peer-to-peer

peer-to-peer

adjective
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Description. Download the most essential and comprehensive **dictionary** app for dependable definitions at your fingertips. **Dictionary**.com is the leading free ...

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Urban Dictionary, August 16: Clout Demon
https://www.urbandictionary.com/
Someone who is possessed by clout chasing. The original human is now gone and a demonic entity that feeds on clout is all that is left. An empty shell with no ...

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APPENDIX T

dictionary Meaning in the Cambridge English Dictionary
https://dictionary.cambridge.org/dictionary/english/dictionary
dictionary definition: 1. a book that contains a list of words in alphabetical order and that explains their meanings, or gives a word for them in another language; ...

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Remote control

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by Chris Woodford. *Last updated: June 25, 2018.*

The way we love our remote controls, you'd think our living rooms were the size of Texas! It's an awfully long way to go, isn't it, to change the television channel or pump up the volume on the stereo? Remote controls are a perfect indulgence for couch potatoes everywhere—but have you ever stopped to wonder how they work? How come your TV remote doesn't trigger the video? Why do you have to point it directly at the TV? And when you aim your remote at a neighbor's house, does their TV channel change too? Let's take a closer look at the mysteries of remote control!

Photo: A typical TV remote control unit. Early TV remotes did little more than change the channel. With a modern remote control, you can control virtually every aspect of how a TV works. This remote can also control a DVD player hooked up to the TV set.

How remote controls use infrared beams

Photo: The small infrared LED on the top of a typical remote control.

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APPENDIX U
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The first thing you notice about a remote control unit is that it has no wires, so it has to send signals to whatever it's operating using electromagnetic waves. Light, x-rays, radio waves, and microwaves are all examples of electromagnetic waves: vibrating packets of electrical and magnetic energy that travel through the air at the speed of light. Most remote controls send signals using infrared radiation (which is a kind of invisible red light that hot objects give off and halogen hobs use to cook with), though some use radio waves instead.

If you look at the top of your remote control unit, you'll see there's a small plastic light-emitting diode (LED) where the infrared radiation comes out. Now take a look at your TV or video. Somewhere on the front, there's a very small infrared light detector. When you press the remote control, a beam of infrared radiation travels from the remote to your TV at the speed of light and the detector picks it up.

Human eyes can't detect infrared, so even if you press the buttons on your remote and stare at the LED you won't see anything happening. Some animals, including rattlesnakes, *can* detect infrared. Rattlesnakes have tiny infrared detectors buried in pits near their eyes, which work a bit like the infrared detectors on your TV. By homing in on infrared heat, snakes can locate prey at night when there's no ordinary light to see by. What would happen if you pointed a TV remote control at a snake and pressed the buttons? Maybe it would think you were a mouse and slither over to eat you. It's unlikely you could control a rattlesnake with a TV remote—and we don't recommend you try!



Photo: Rattlesnakes "speak" infrared, just like TV sets. Picture by courtesy of US Fish & Wildlife Service.

Remote control codes

It's no good the remote control just sending out a burst of random infrared. Clearly if your remote control has 20 or more buttons on it, it must have a way of sending out at least this many signals—each one different enough for your TV to be able to decode and understand it. When you press one of the buttons, the remote generates a systematic series of on/off infrared pulses that signal a **binary code** (a way of representing any kind of information using only zeros and ones, which computers use). So a short pulse of infrared could signal a 1 and no pulse could signal a 0. Sending many infrared pulses, one after another, allows your remote to send whole strings of zeros and ones. One code (maybe it's

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101101) might mean "volume up", while another (perhaps 11110111) could mean "mute sound."

As well as sending out pulses that tell the TV what you want it to do, the remote also sends a short code that identifies the product you're trying to control (for example, a specific make and model of TV). That ensures your remote operates only the TV, not the video, and not any other TVs that happen to be nearby. Generally, this means each remote control unit can operate only one appliance made by only one manufacturer. Of course if you could discover the codes that different TVs and videos understand, you could build a remote control that operated any appliance. This is how **universal remotes** work. They let you control any TV or video and, instead of sending out only signals specific to one brand of equipment, they can send out codes that any make or model can understand. One inventor has even gone so far as to develop a remote called TV-B-Gone that systematically sends out a "switch TV off" signal using every possible manufacturer's code. It's designed to allow TV haters to switch off annoying TVs covertly as they wander through shopping malls and department stores!



Screenshot: Turn your smartphone into a remote control. If your phone has a built-in infrared transmitter, you can use it as a remote control. Here's my Android phone set up with an app called Quick Remote to behave like a Sony TV remote control. Apps like this can control TVs, set-top boxes, stereos, air conditioners, projectors, and pretty much anything else for which you can figure out the right infrared codes. Unfortunately, iPhones don't have IR transmitters so, if you're an Apple fan, you'll need to get an adapter if you want to do this sort of thing with your phone.

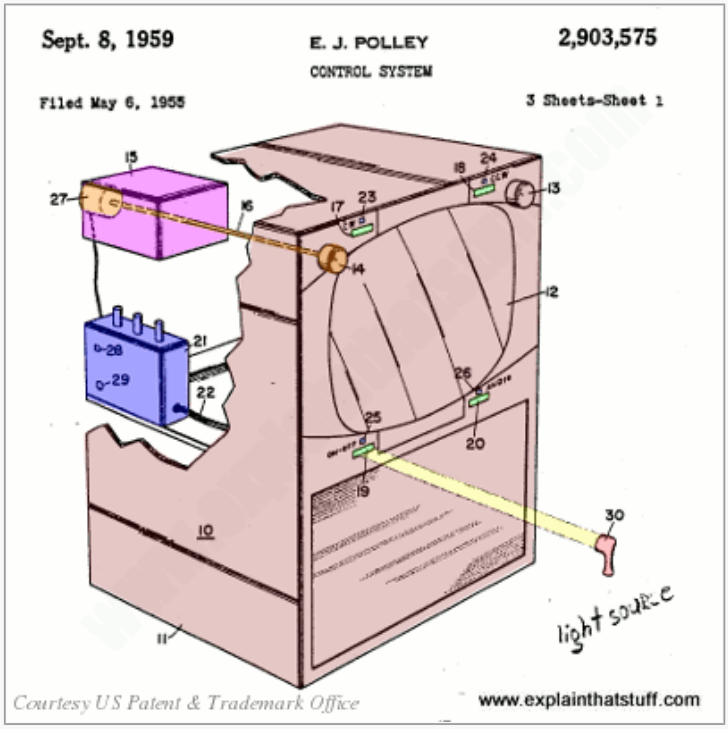
Can I switch on my neighbor's TV set?

Infrared remote controls are relatively low powered and will send signals only about 10–20m (35–70ft). Like visible light, infrared is relatively low-energy electromagnetic radiation and, unlike radio waves, cannot penetrate through solid walls. That means there's no chance your ordinary infrared remote will switch on your neighbor's TV or DVD recorder by accident!

If you do want to operate equipment in other rooms, it's possible to buy radio-frequency remote controls (and adapters for conventional, infrared remotes) to extend their range. A typical RF remote might operate in the frequency range 400–450 MHz, where an ordinary infrared remote would operate at perhaps 300 THz (3×10^{14} Hz = 300 million million hertz)—roughly a million times higher frequency. With equipment like this, it is possible to receive signals from a neighbor's home, much like you can receive their wireless Internet (Wi-Fi) signals.

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Who invented the remote control?



Artwork: The original electronic TV remote control, from US Patent 2,903,575: Control system by Eugene J. Polley, Zenith Radio Corporation, filed on May 6, 1955 and granted on September 8, 1959. Courtesy of US Patent and Trademark Office.

US electrical engineer **Eugene Polley** (1915–2012) came up with the idea for an electronic remote control system years before many people even owned a television. And here it is, as drawn by the inventor himself! What we have to remember is that mid-20th-century televisions were nothing like as sophisticated as modern ones. Although they were essentially electronic, they still had mechanical tuning systems (so you turned a clunky dial to make the tuner switch from one receiving frequency to another, much like you still do with analog radio sets to this day). That meant Polley's remote control was a part electronic, part mechanical device, and quite a bit more cumbersome than the ones we have now, although no less ingenious.

How did it work? You pointed a simple handheld flashlight (labeled 30, "light source") at one of four photoelectric cells (shown here in green and numbered 17, 18, 19, and 20), each of which was linked to a separate electronic switch (numbered 23, 24, 25, and 26) and controlled a separate function of the TV. On the top left, 17 operated an electric motor, 27, which automatically turned the TV tuner dial to a higher frequency. On the top right, 18 turned the dial the opposite way. On the bottom left, 19 switched the TV on or off. And on the bottom right, 20 adjusted the audio volume. Everything was controlled through electronic circuits in the blue box marked 21.

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Radio control



Photo: A typical radio-controlled helicopter. Inside, the "passenger compartment" is packed with radio-receiver electronics, a motor that spins the main rotor, and servo motors that control the steering (rotor pitch) in exactly the same way as a real helicopter's. This is an exhibit at the Think Tank science museum in Birmingham, England.

Infrared remotes can operate TVs and videos only over quite short distances. The infrared LED is quite small and low-powered and the receiver on the TV or video is small too. This is why you generally have to point the remote directly at the appliance you're trying to control. Some remotes are more tolerant and it is sometimes possible to bounce the infrared beam off a wall, mirror, or picture and still change channel. Infrared remotes are no good for controlling things over distances greater than a few meters (feet); the infrared energy is too easily soaked up and dissipated along its journey.

To control things over greater distances, you need to use a different kind of system called **radio control**. You operate radio-controlled cars, trucks, boats, airplanes, and robots using a handheld radio transmitter box that sends signals from an antenna on the top to a matching antenna on whatever you're interested in controlling. Radio signals can travel much further than infrared ones without interference, especially if the transmitters and antennas are large and powerful.

Types of radio control

There are two broad types of radio control known as single channel and multi-channel.

Single-channel radio control is effectively an on-off switch operated at a distance by radio wave. So, to give a very trivial example, you could use a single-channel control to switch a lamp on or off at the bottom of your garden. The sender unit would consist of a low-powered radio transmitter, while the lamp would need a radio receiver and a relay (to convert the low-powered, incoming radio signal into a higher-powered electric current big enough to operate the lamp). Single-channel radio control can only switch things completely on or completely off; it can't turn them up or down by degrees.

Multi-channel radio control is used to transmit more complex and useful signals to a piece of remote equipment—for example, to make a radio-controlled car speed up, slow down, or steer from

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side to side. Instead of just sending a basic on/off signal, it transmits a series of coded analog or digital pulses that are decoded by the receiver and used to produce specific actions. For example, turning a steering wheel on a radio-control transmitter will send a series of pulses that make an electric motor rotate by a corresponding amount to steer a radio-controlled car one way or the other. Motors that work this way are known as **servo motors**. Unlike normal electric motors, which rotate an arbitrary number of times according to how long they receive an electric current, servo motors are much more controllable and have built-in electronic feedback mechanisms (based on potentiometers—similar to variable resistors), which enable you to make them rotate by reasonably precise amounts.

What is radio control used for?

Radio control isn't just used in toys; many of the latest wireless gadgets use similar technology, including Bluetooth® (a convenient way of operating computer-based equipment without wires), RFID (radio frequency identification) technology used in anti-shoplifting systems, and Wi-Fi, used in wireless Internet. Even cellphones communicate using a wireless system not unlike radio control. So maybe remote control isn't just for couch potatoes after all?

How to repair a broken TV remote control

With no moving parts, you might think a remote control would last forever. But all that pushing and poking eventually takes its toll. One day, you may find your remote stops working: the buttons you press no longer do anything, no matter how hard you prod them.

This can be a real nuisance, because chances are your TV is now obsolete and the remote you need is no longer manufactured. Fortunately, it's often possible to repair a defunct remote. If the entire remote stops working, most

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likely the batteries have gone. That's the first, most obvious thing to test before you go any further.

If only a couple of buttons have gone—typically the volume up/down or channel buttons, or other buttons you use most often—you have a different problem. Remotes are built around a **rubber membrane keypad**. Each key is part of a single, large piece of rubbery plastic. Under each one, there's a thin strip of conducting paint or plastic. When you press the key down, the conducting material bridges contacts on the printed circuit board directly underneath, completing a switch and activating the circuit. In the top photo here, you can see the membrane keypad (second from the right) and the circuit board it sits on (second from the left). Over time, a thin greasy film builds up between the bottom of the keys and the top of the circuit board. I'm not sure what causes this, and it doesn't really matter (probably as the current flows through the conducting material on the base of the key it warms up slightly and that gradually degrades the material). This film acts as a barrier between the base of the key and the circuit board and stops the keys from completing the circuit.

How to fix it? First, remove the batteries. Next, carefully open the case of your remote. You'll either have to undo some screws or, with a remote like the one shown here, separate the top of the case from the bottom with a thin, flat screwdriver. Generally, if there are no screws, there are several

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plastic clips holding the two parts together and you need to find them and push them gently to open the case. Go carefully! Once you've taken the case apart, separate out the layers as I've done here. Inspect the circuit board, particularly the bits of the board that are directly underneath the buttons that aren't working. See a film there or a dirty deposit? Put a small amount of detergent and water on a cloth and carefully wipe it away. Don't use anything abrasive. Gently wipe the bottom of the rubber membrane keys to remove any film from there too. Do this very carefully so you don't damage or degrade the conducting layer. Make sure the whole thing is completely dry, reassemble it, and you may well find it works again.

If it still doesn't work, the conducting layer on the base of the non-functioning keys has probably worn away. (If you have a multimeter, you can test the bottom of the keys to see if any current flows, and establish that this is the fault beyond doubt.) You can buy repair kits and conducting paint pens to touch up the damaged layers, but they're quite expensive and it might not be worth the bother. In theory, you could use a soft graphite pencil to make a temporary repair, but that's unlikely to last very long. Another option might be to transplant one of the working keys to replace the broken ones, but since these keypads are built from a single piece of material, that's going to be a slightly tricky operation involving rubber surgery!

A simpler alternative is simply to find the model number from your remote and type it into eBay or your favorite auction site. You might well find a replacement someone no longer wants.

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On other sites

- How To Radio Control DC Motors Cheaply: An introductory project showing you how to use an off-the-shelf radio transmitter to control motors (from the Instructables website).
- Build your own radio remote control by Howard G. McEntree. Popular Mechanics, August 1964. A great "retro" article from yesteryear that gives a fascinating insight into what hobbyist electronics was like a few decades ago!

Books

- Radio-Control Car Manual: The complete guide to buying, building and maintaining by Matt Benfield. Haynes Publishing, 2008/2017. A good beginner's introduction in 176 pages.
- 22 Radio and Receiver Projects for the Evil Genius by Thomas Petruzzellis. McGraw Hill Professional, 2008. A collection of easy-to-build projects involving sending or receiving radio waves, including various kinds of radio receivers and detectors.
- Remote Control Robotics by Craig Sayers. Springer, 1999. A basic introduction to the real-world problem of operating robots remotely in often unpredictable environments.

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Articles

- Streamlining the Universal Remote Device by Eric A. Taub. The New York Times, February 10, 2016.
- Eugene Polley, Conjuror of a Device That Changed TV Habits, Dies at 96: The New York Times obituary for the inventor of the TV remote control, Eugene Polley (1915–2012).
- TV remote control inventor Eugene Polley dies at 96: BBC News, 22 May 2012. A short obituary with a video clip of Polley's original Flash-Matic gadget.
- Remote Control by Robert W. Lucky. IEEE Spectrum, March 1, 2006. An electronics engineer discovers a new respect for the humble household remote.

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Inside a TV Remote Control

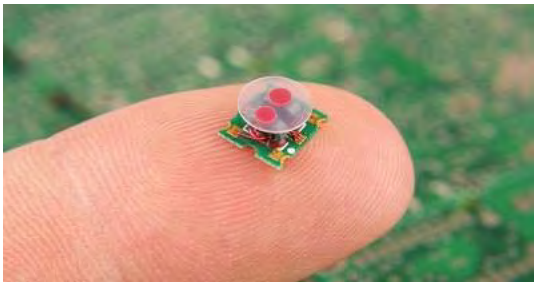
BY MARSHALL BRAIN

NEXT



If you are like most Americans, you probably pick up a TV remote control at least once or twice a day. Let's look inside and see how they work. Here is the remote we will be dissecting today:

The remote control's job is to wait for you to press a key, and then to translate that key-press into infrared (pronounced "infra-red") light signals that are received by the TV. When you take off the back cover of the control you can see that there is really just 1 part visible: a **printed circuit board** that contains the electronics and the battery contacts.





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The components that you see here are typical for most remotes. You can see an **integrated circuit** (also known as a **chip**) labeled "TA11835". The chip is packaged in what is known as an **18 pin Dual Inline Package**, or a **DIP**. To the right of the chip you can see a diode, a transistor (black, with three leads), a resonator (yellow), two resistors (green) and a capacitor (dark blue). Next to the battery contacts there is a resistor (green) and a capacitor (tan disk). In this circuit, the chip can detect when a key is pressed. It then translates the key into a sequence something like morse code, with a different sequence for each different key. The chip sends that signal out to the transistor to amplify the signal and make it stronger.





How Remote Controls Work

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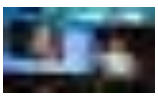
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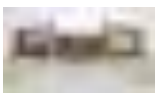
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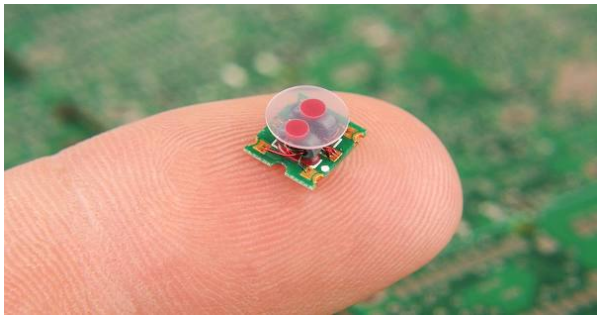
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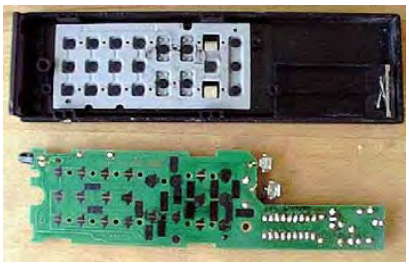
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Inside a TV Remote Control

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The Circuit Board

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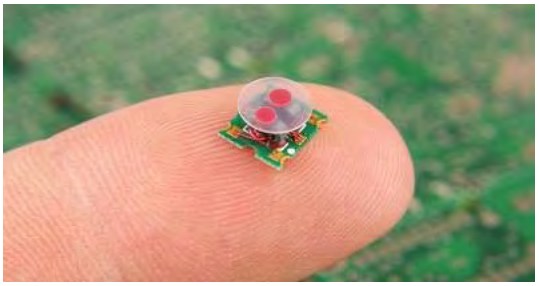


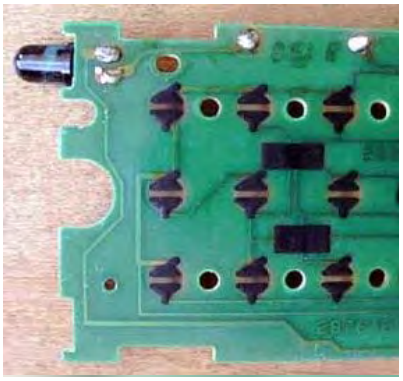
When you unscrew the circuit board and take it out, you can see that the circuit board is a thin piece of fiber glass that has thin copper "wires" etched onto its surface. Electronic parts are assembled on printed circuit boards because they are easy to mass produce and assemble. In the same way that it is relatively inexpensive to print ink onto a sheet of paper, it is inexensive to "print" copper wires onto a sheet of fiber glass. It is also easy to have a machine drop the parts (the chips, transistors, etc.) onto the sheet of fiberglass and then solder them on to connect them to the copper wires.

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When you look at the board, you can see a set of contact points for the buttons. The buttons themselves are made of a thin rubbery sheet. For each button there is a black conductive disk. When the disk touches the contacts on the printed circuit board, it connects them and the chip can sense that connection.





At the end of the circuit board there is an **infrared LED**, or **Light Emitting Diode**. You can think of an LED as a small light bulb. Many LEDs produce visible light, but a remote's LED produces infrared light that is invisible to the human eye. It is not invisible to all eyes, however. For example, if you have a camcorder it can see the infrared light. Point your remote at the camera and push a button. You will be able to see the infrared light flashing in the viewfinder. The receptor in the TV is able to see infrared light as well.

So the basic operation of the remote goes like this: You press a button. When you do that you complete a specific connection. The chip senses that connection and knows what button you pressed. It produces a morse-code-line signal

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specific to that button. The transistors amplify the signal and send them to the LED, which translates the signal into infrared light. The sensor in the TV can see the infrared light and "seeing" the signal reacts appropriately.

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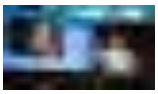
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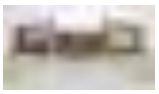
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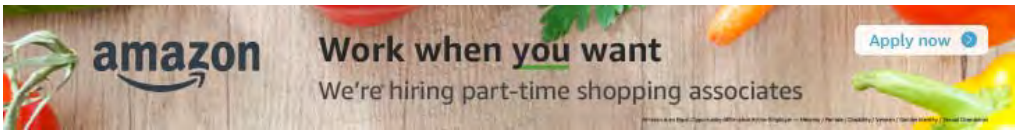
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APPENDIX W

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THE PURPOSE OF A FLEX CIRCUIT STIFFENER



Written by Paul Tome
Posted on June 7, 2017 at 9:05 AM

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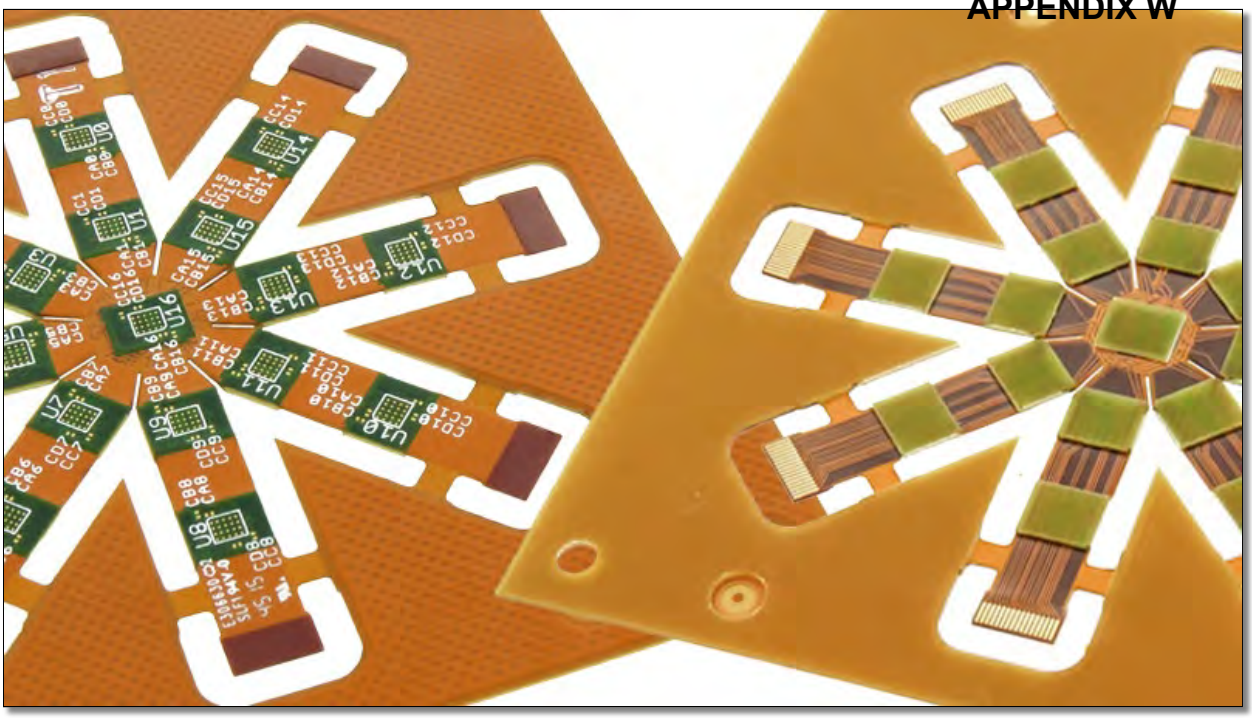
In the world of flexible circuit boards, stiffeners are a common requirement in a lot of flex designs. By definition, a circuit board stiffener provides a mechanical support function and is not part of the electrical schematic of a design.

For the majority of applications, stiffener requirements fall in one or both of the following categories:

1. Rigidize localized areas to support components and or connectors.
2. Increase the flex circuit thickness in specific areas to either meet ZIF connector specifications or to constrain bend areas to predefined locations.

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Example of Flex Circuit Stiffener

Rigidizing Stiffeners Help Support Components

In many instances a stiffener is used to create a localized rigid area in the flex circuit where components and or connectors are attached. This also prevents the circuit from being bent in or adjacent to the component area(s) which can potentially compromise the part's solder joint integrity.

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FR4 Stiffeners for Flexible PCBs

The most common material used for stiffeners in flex PCB designs is FR4 with thicknesses varying from 0.008" up to 0.059". The most common thicknesses used are 0.020", 0.031", 0.039" or 0.059". The general rule is to use the thickest stiffener that the design will allow for up to 0.059" which replicates a traditional rigid printed circuit board.

When utilizing a stiffener for plated-through hole (PTH) components, the stiffener(s) need to be located on the same side of the flex from which the component is inserted to allow access to solder pads on the flex circuit. FR4 stiffeners may also have copper features, e.g.; pads or plated holes used for component mounting purposes etc.

Additional Stiffener Materials

In some flexible circuit designs, alternate materials, such as stainless steel or aluminum are available. These are typically used for applications requiring heat sinking or added rigidity but will significantly increase the

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cost of the parts and should only be used when required.

Flex Stiffener Attachment Methods

The preferred attachment method is to thermally bond the stiffener to the circuit (using heat and pressure). This method utilizes the same flexible adhesive as used to attach the Coverlays. This manufacturing process will result in a very strong permanent bond.

An alternative attachment method available is done with a pressure sensitive adhesive (PSA), e.g.: 3M467 or 3M9077, if the design prevents the use of a flex adhesive. The specific PSA will depend on whether the flex PCB will be subjected to an automated reflow cycle and or what material it is to be adhered to.

Type of adhesive will also depend upon the configuration and or location of the stiffener(s). For an example, if a stiffener does not extend out to the circuit outline it will, in most cases, require a PSA attachment and an additional stiffener outline added to the silkscreen to allow for accurate placement.

Multiple Stiffener Thicknesses in the Same Design

In some cases, multiple stiffener thicknesses can be used within the same flex circuit design. A manufacturability review done by your supplier is required as there are some limitations in this process.

Stiffeners can be attached to either one or both sides of a part. If attached to both sides the assembly requirements and assembly array configuration will need to be reviewed by your supplier to determine if there will be any complications at assembly.

For flex circuit designs with an assembly array requirement, it is common and cost effective to include the FR4 stiffener throughout the array border. This results in a rigid array which in most cases, allows the parts to run through automated assembly in the same manner as a rigid circuit board design eliminating the need for any additional tooling plates etc.

Using Stiffeners To Increase Thickness

Polyimide stiffeners are the most common method to achieve the thickness requirement, at the contact fingers, as specified by the ZIF connector that the flex circuit plugs into. Some common thickness requirements are 0.3mm or 0.2mm. This thickness is be achieved by adding a thin Polyimide layer in the finger area only per the connector specifications. Stiffener thickness can vary between 0.002” and 0.008” depending upon the flex circuit material construction what the added amount is required to meet the connector spec.

It is not recommended to design a “thicker” flex PCB in an attempt to eliminate the need for a ZIF stiffener. This will result in an excessively thick part that will not have the required flexibility or bend reliability and will be much more costly. ZIF connectors have tight dimensional tolerance in the finger area width, so only a thermally bonded Polyimide stiffener can be used for this application.

Stiffeners for ZIF connectors can be attached to one or both sides of a flex circuit design. It is recommended to include the ZIF connector part number in the part data/drawing to allow your supplier to review and ensure the flex design meets the appropriate connector specs.

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Adding Stiffeners for Bend Constraints

Stiffeners are also be used to restrict the bend areas to specific location(s) within a flex design to either facilitate the final assembly process or to achieve a specific bend requirement or end use function.

These stiffeners are typically an added thin layer of Polyimide material, usually 0.002” – 0.008”, but thicker layers of FR4 can be used if required.

A design review should always be done to ensure that the stiffener(s) do not create any mechanical bend stress concentrator that may result in a kink in the part rather than a bend in a preferred smooth arc.

Summary

The purpose of a flex circuit stiffener is to add a significant amount of functionality to your design and can be configured in an extremely wide range of combinations. All stiffener types can be combined in any flex PCB design. The mechanical nature of a stiffener’s function is one area of flex design that differs significantly from that of rigid printed circuit boards. This is a significant area in which our customers require design support to ensure that the finished parts meet their requirements.

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GEORGIOS PAPANIKOLAOU
8/16/2018, 5:16:46 AM

Very informative article , thanks.

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Just one question concerning the ZIF connector part number in the data/drawing. How is this usually done?

For example if it in the drawing, is it just plain text on a seprate unused layer or in the silk layer?

If it in the data, what data are we talking about, a plain readme file?

I usually just send a zipped folder with gerber files and have never included anything else, thus the confusion.

Thank you

Reply to *Georgios Papanikolaou*

EPEC ENGINEERED TECHNOLOGIES

8/16/2018, 8:00:13 AM

Hello Georgios,

Thanks for commenting.

We most often see the ZIF connector part number specified in the mechanical drawing for the design.

A drawing note is added stating that ZIF finger area must meet the requirements of the ZIF connector specification.

It can also be included in a separate readme file.

Reply to *Epec Engineered Technologies*

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Wi-Fi / WLAN Channels, Frequencies, Bands & Bandwidths

- Wi-Fi / WLAN / 802.11 channels, their channel frequencies and bandwidth allocations around the globe, spectral mask and summary of which channels can be used together for WLAN solutions.

WI-FI 802.11 TUTORIAL INCLUDES

IEEE 802.11 standard tutorial (ieee-802-11-standards-tutorial.php) IEEE 802.11a (ieee-802-11a.php)
IEEE 802.11b (ieee-802-11b.php) IEEE 802.11e (ieee-802-11e.php) IEEE 802.11g (ieee-802-11g.php)
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IEEE 802.11ah (ieee-802-11ah-sub-ghz-wifi.php) IEEE 802.11ax (ieee-802-11ax.php)
802.11 Wi-Fi channels & frequencies (80211-channels-number-frequencies-bandwidth.php)
Hotspot 2.0 (ieee-802-11u-hotspot2.php)

The IEEE 802.11 Wi-Fi / WLAN standards set the attributes for the different channels that may be used.

These attributes enable different Wi-Fi modules to talk to each other and effectively set up a WLAN.

To ensure that WLAN solutions operate satisfactorily, parameters such as the RF signal centre frequencies, channel numbers and the bandwidths must all be set..

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Use our sister website to find out even more information about Wi-Fi channels, bands and frequencies (https://www.electronics-notes.com/articles/connectivity/wifi-ieee-802-11/channels-frequencies-bands-bandwidth.php).

ISM bands

Wi-Fi is aimed at use within unlicensed spectrum. This enables users to access the radio spectrum without the need for the regulations and restrictions that might be applicable elsewhere. The downside is that this spectrum is also shared by many other users and as a result the system has to be resilient to interference.

There are a number of unlicensed spectrum bands in a variety of areas of the radio spectrum. Often these are referred to as ISM bands - Industrial, Scientific and Medical, and they carry everything from microwave ovens to radio communications. Many of these bands, including he two used for Wi-Fi are global allocations, although local restrictions may apply for some aspects of their use.

The main bands used for carrying Wi-Fi are those in the table below:

LOWER FREQUENCY MHZ	UPPER FREQUENCY MHZ	COMMENTS
2400	2500	Often referred to as the 2.4 GHz band, this spectrum is the most widely used of the bands available for Wi-Fi. Used by 802.11b, g, & n. It can carry a maximum of three non-overlapping channels.
5725	5875	This 5 GHz band or 5.8 GHz band provides additional bandwidth, and being at a higher frequency, equipment costs are slightly higher, although usage, and hence interference is less.It can be used by 802.11a & n. It can carry up to 23 non-overlapping channels, but gives a shorter range than 2.4 GHz.

802.11 systems and bands

There are several different 802.11 variants in use. Different 802.11 variants use different bands. A summary of the bands used by the 802.11 systems is given below:

IEEE 802.11 VARIANT	FREQUENCY BANDS USED	COMMENTS
802.11a	5GHz	*Read more about **802.11a (ieee-802-11a.php)***
802.11b	2.4GHz	*Read more about **802.11b (ieee-802-11b.php)***
802.11g	2.4GHz	*Read more about **802.11g (ieee-802-11g.php)***
802.11n	2.4 & 5 GHz	*Read more about **802.11n (ieee-802-11n.php)***
802.11ac	Below 6GHz	*Read more about **802.11ac (ieee-802-11ac-gigabit.php)***
802.11ad	Up to 60 GHz	*Read more about **802.11ad (ieee-802-11ad-microwave.php)***
802.11af	TV white space (below 1 GHz)	*Read more about **802.11af (ieee-802-11af-white-fi-tv-space.php)***
802.11ah	700 MHz, 860MHz, 902 MHz, etc. ISM bands dependent upon country and allocations	Read more about **802.11ah (ieee-802-11ah-sub-ghz-wifi.php)**

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2.4 GHz 802.11 channels

There is a total of fourteen channels defined for use by Wi-Fi 802.11 for the 2.4 GHz ISM band. Not all of the channels are allowed in all countries: 11 are allowed by the FCC and used in what is often termed the North American domain, and 13 are allowed in Europe where channels have been defined by ETSI. The WLAN / Wi-Fi channels are spaced 5 MHz apart (with the exception of a 12 MHz spacing between the last two channels).

The 802.11 WLAN standards specify a bandwidth of 22 MHz and channels are on a 5 MHz incremental step. Often nominal figures for the channel bandwidth of 20 MHz are often given. The 20 / 22 MHz bandwidth and channel separation of 5 MHz means that adjacent channels overlap and signals on adjacent channels will interfere with each other.

The 22 MHz channel bandwidth holds for all standards even though 802.11b WLAN standard can run at variety of speeds: 1, 2, 5.5, or 11 Mbps and the newer 802.11g standard can run at speeds up to 54 Mbps. The differences occur in the RF modulation scheme used, but the WLAN channels are identical across all of the applicable 802.11 standards.

When using 802.11 Wi-Fi to provide WLAN solutions for offices, general use hotspots, or for any WLAN applications, it is necessary to ensure that parameters such as the channels are correctly set to ensure the required performance is achieved.

2.4 GHz Wi-Fi channel frequencies

The table given below provides the frequencies for the total of fourteen 802.11 Wi-Fi channels that are available around the globe. Not all of these channels are available for use in all countries.

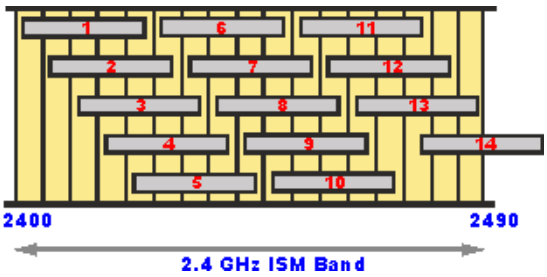
CHANNEL NUMBER	LOWER FREQUENCY MHZ	CENTER FREQUENCY MHZ	UPPER FREQUENCY MHZ
1	2401	2412	2423
2	2406	2417	2428
3	2411	2422	2433
4	2416	2427	2438
5	2421	2432	2443
6	2426	2437	2448
7	2431	2442	2453
8	2436	2447	2458
9	2441	2452	2463
10	2446	2457	2468
11	2451	2462	2473
12	2456	2467	2478
13	2461	2472	2483
14	2473	2484	2495

2.4 GHz WiFi channel overlap and selection

The channels used for WiFi are separated by 5 MHz in most cases but have a bandwidth of 22 MHz. As a result channels overlap and it can be seen that it is possible to find a maximum of three non-overlapping channels. Therefore if there are adjacent pieces of WLAN equipment that need to work on non-interfering channels, there is only a possibility of three. There are five combinations of available non overlapping channels are given below:

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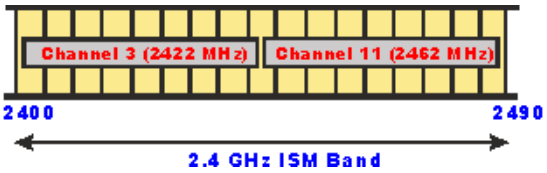
Wi-Fi Channel overlap and which ones can be used as sets.

From the diagram above, it can be seen that Wi-Fi channels 1, 6, 11, or 2, 7, 12, or 3, 8, 13 or 4, 9, 14 (if allowed) or 5, 10 (and possibly 14 if allowed) can be used together as sets. Often WiFi routers are set to channel 6 as the default, and therefore the set of channels 1, 6 and 11 is possibly the most widely used.

As some energy spreads out further outside the nominal bandwidth, if only two channels are used, then the further away from each other the better the performance.

It is found that when interference exists, the throughput of the system is reduced. It therefore pays to reduce the levels of interference to improve the overall performance of the WLAN equipment.

With the use of IEEE 802.11n, there is the possibility of using signal bandwidths of either 20 MHz or 40 MHz. When 40 MHz bandwidth is used to gain the higher data throughput, this obviously reduces the number of channels that can be used.



802.11n 40 MHz channel capacity

The diagram above shows the 802.11n 40 MHz signals. These signals are designated with their equivalent centre channel numbers.

2.4 GHz WLAN / Wi-Fi Channel availability

In view of the differences in spectrum allocations around the globe and different requirements for the regulatory authorities, not all the WLAN channels are available in every country. The table below provides a broad indication of the availability of the different Wi-Fi channels in different parts of the world.

CHANNEL NUMBER	EUROPE (ETSI)	NORTH AMERICA (FCC)	JAPAN
1	✓	✓	✓
2	✓	✓	✓
3	✓	✓	✓
4	✓	✓	✓
5	✓	✓	✓
6	✓	✓	✓
7	✓	✓	✓
8	✓	✓	✓
9	✓	✓	✓

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CHANNEL NUMBER	EUROPE (ETSI)	NORTH AMERICA (FCC)	JAPAN
10	✓	✓	✓
11	✓	✓	✓
12	✓	No	✓
13	✓	No	✓
14	No	No	802.11b only

This chart is only provides a general view, and there may be variations between different countries. For example some countries within the European zone Spain have restrictions on the channels that may be used (France: channels 10 - 13 and Spain channels 10 and 11) use of Wi-Fi and do not allow many of the channels that might be thought to be available, although the position is likely to change.

5 GHz WiFi channels & frequencies

As the 2.4 GHz band becomes more crowded, many users are opting to use the 5 GHz ISM band. This not only provides more spectrum, but it is not as widely used by Wi-Fi as well as many other appliances including items such as microwave ovens, etc.

It will be seen that many of the 5 GHz Wi-Fi channels fall outside the accepted ISM unlicensed band and as a result various restrictions are placed on operation at these frequencies.

CHANNEL NUMBER	FREQUENCY MHZ	EUROPE (ETSI)	NORTH AMERICA (FCC)	JAPAN
36	5180	Indoors	✓	✓
40	5200	Indoors	✓	✓
44	5220	Indoors	✓	✓
48	5240	Indoors	✓	✓
52	5260	Indoors / DFS / TPC	DFS	DFS / TPC
56	5280	Indoors / DFS / TPC	DFS	DFS / TPC
60	5300	Indoors / DFS / TPC	DFS	DFS / TPC
64	5320	Indoors / DFS / TPC	DFS	DFS / TPC
100	5500	DFS / TPC	DFS	DFS / TPC
104	5520	DFS / TPC	DFS	DFS / TPC
108	5540	DFS / TPC	DFS	DFS / TPC
112	5560	DFS / TPC	DFS	DFS / TPC
116	5580	DFS / TPC	DFS	DFS / TPC
120	5600	DFS / TPC	No Access	DFS / TPC
124	5620	DFS / TPC	No Access	DFS / TPC
128	5640	DFS / TPC	No Access	DFS / TPC
132	5660	DFS / TPC	DFS	DFS / TPC
136	5680	DFS / TPC	DFS	DFS / TPC
140	5700	DFS / TPC	DFS	DFS / TPC
149	5745	SRD	✓	No Access
153	5765	SRD	✓	No Access
157	5785	SRD	✓	No Access
161	5805	SRD	✓	No Access
165	5825	SRD	✓	No Access

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Note 1: there are additional regional variations for countries including Australia, Brazil, China, Israel, Korea, Singapore, South Africa, Turkey, etc. Additionally Japan has access to some channels below 5180 MHz.

Note 2: DFS = Dynamic Frequency Selection; TPC = Transmit Power Control; SRD = Short Range Devices 25 mW max power.

As WLAN and Wi-Fi technology develops further new bands will be added to enable sufficient interference bandwidth to be available to ensure the ever increasing requirement for the transfer of high speed data.

The bands allocated to Wi-Fi are generally relatively stable in view of their widespread use, although changes can occur. Find out more information about Wi-Fi channels, bands and frequencies (https://www.electronics-notes.com/articles/connectivity/wifi-ieee-802-11/channels-frequencies-bands-bandwidth.php).

By Ian Poole (https://plus.google.com/104687638164370436625?rel=author)

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How to Select, Use, and Maintain Coaxial Connectors for RF Applications (https://ad.doubleclick.net/ddm/clk/424287181;226281486;l?https://www.digikey.com/en/articles/techzone/2018/jun/how-to-select-use-maintain-coaxial-connectors-rf-applications)

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How Xbox 360 Works

BY ROBERT VALDES

Xbox Controller

PREV NEXT



©2005 HowStuffWorks The new Xbox 360 controller is a familiar

The design for the Xbox 360 controller is based largely on the one used for the original Xbox -- the **Controller S**.

The most noticeable difference in the Xbox 360 controllers from those for the original Xbox is that most of them are **wireless**. Microsoft created a proprietary technology to deal with some of the latency and bandwidth issues that can be a problem for some wireless controllers. The Xbox 360 can support up to four wireless controllers at one time.



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includes a wired controller with a nine-foot cable. Everything else about the design is the same. Of course, wireless controllers are available separately if you choose to upgrade.

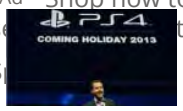
The new Xbox 360 wireless controllers can be powered by either a pair of traditional AA batteries or a rechargeable battery pack. The battery pack can be "flash charged" in a charger or "trickle charged" via a USB connection to the console, and it alerts the user when its charge is running low.

The Xbox 360 controller has a **Guide** button in the center of its face that provides a new functionality. This button is divided into four quadrants that light up to provide gamers with different types of information during game play. (Incidentally, the "ring of light" power button on the console also provides this function.) For instance, during a split screen multiplayer match, a particular quadrant will light up to indicate to a player which part of the screen he or she is playing on at that time. The Guide button can also light up to let a player know he has received a message from another gamer. In this case, when the user pushes the button, he or she visits the Xbox **dashboard** (the equivalent of a PC's desktop). The dashboard provides access to features like messaging friends, downloading content, voice chat and customizing soundtracks, all while staying in the game. The controller has a standard headphone jack on the back so that the user can plug in a headset for voice communication during game play. Some wireless headsets will also work with the Xbox 360.

The new Xbox 360 controller has the same basic familiar button layout as the Controller S except that a few of the auxiliary buttons have been


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moved. The "back" and "start" buttons have been moved to a more central position on the face of the controller, and the "white" and "black" buttons have been removed and replaced with two new shoulder buttons that are positioned over the analog triggers on the back of the controller.

One of the great features of Xbox 360 is its ability to let players compete against one another online. Learn about Xbox LIVE on the next page.

CONTROL ISSUES

When the original Xbox was released in 2001, one of the most common complaints about the new console was the controller. Gamers worldwide criticized it for being too large and having poor button spacing. In Japan, where the Xbox sales were already suffering, Japanese gamers all but refused to use the large Xbox controllers, opting instead for smaller, third-party ones. This compelled Microsoft to create a smaller, redesigned controller for Asian markets that was released in winter 2002. Shortly after that, Microsoft released a slightly improved version of the Japanese controller in the west called the Controller S. The Controller S is now the standard Xbox controller that is shipped with all Xbox consoles.

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