

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,
Petitioner,

v.

MULLEN INDUSTRIES LLC,
Patent Owner.

Case No. IPR2025-00737
U.S. Patent No. 8,585,476

PATENT OWNER'S PRELIMINARY RESPONSE

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TABLE OF EXHIBITS

Exhibit	Description
2001	Dictionary definition of “Playing field” – Merriam-Websters Collegiate Dictionary. 10 th Ed., 2001
2002	Dictionary definition of “playing field” – The Chambers Dictionary, 2003
2003	Dictionary definition of “playfield” – Dictionary of Architecture & Construction, 2000
2004	Dictionary definition of “playfield” – Webster’s Third New International Dictionary of the English Language Unabridged, 2002

Mullen Industries LLC (“Patent Owner” or “Mullen”) submits this Preliminary Response to the Petition for *Inter Partes* Review (“Petition”) of U.S. Patent No. 8,585,476 (“the ’476 Patent”) filed by Meta Platforms, Inc. (“Petitioner”).

I. Introduction

The ’476 patent improves upon prior-art virtual reality (“VR”) systems in which a user might unintentionally run into objects while playing the game due to obscured vision. It also improves prior systems that attempted to solve that problem by using safety rails surrounding a small platform, which provided some measure of safety but still presented risks and prevented using natural body movement to play a game and instead relied on joysticks and the like.

The Board should deny institution because Ground 1, the sole ground relied on for the challenged independent claims, claims 1 and 13, fails to teach “a physical *playfield*,” which under the proper construction is a “bounded physical play space,” and is required by all challenged claims, and the other grounds all rely on Ground 1 for that element. Both references in Ground 1, Jaszlics and Piekarski, exclusively adopt the prior-art approach wherein a user plays a game in unbounded space, leading to exactly the problems with the prior art described in the ’476 patent: that the user might run into objects unintentionally while playing. Nor does the Petition propose modifying this aspect of either reference. Grounds 2-5 only add references to the Ground 1 combination to attempt to address dependent claims, but they do not

modify the independent claim allegations. All grounds thus fail to teach a “physical playfield,” required by both challenged independent claims, 1 and 13, and thus all claims.

Further, Ground 1 is the sole ground relied on for disclosure of a “wearable processor” as recited in claim 1. The Petition admits Jaszlics lacks a “wearable processor,” and points to combination with Piekarski. But there is no motivation to combine Jaszlics with Piekarski. The Petition proposes a hypothesized system in which Jaszlics is modified so that the virtual simulation is run on a user-wearable device. The Petition specifically proposes “substitution of Jaszlics’ [stationary] computer system with the wearable computer system disclosed in Piekarski,” which allegedly “would have predictably resulted in Jaszlics’ virtual simulation system in which the computer providing the virtual simulation for a user was worn by the user.” Pet., 30-31. But, fatal to the argument, the wearable computer system in the Piekarski reference does not run any virtual simulation. That work is performed on a back-end workstation system (to which the wearable computer connects) that is not alleged to be part of the combination. The combination thus (1) simply would not function, as there is nothing in the combination to run a simulation—the hardware in Jaszlics that runs the simulation is argued to be removed in favor of hardware that does not have the capability (the user-worn hardware in Piekarski), and (2) has no support for providing a virtual simulation in a user-wearable device,

i.e., the hypothesized combination, because neither reference discloses such functionality. The references are also fundamentally incompatible in approach, and one would not undertake the complete redesign of Jaszlics as alleged in the petition, which would have no benefit and would have substantial downside, as explained below. Grounds 2-5 only add references to the Ground 1 combination to attempt to address dependent claims, but they do not modify the independent claim allegations. All grounds thus fail to teach a “wearable processor” (claim 1).

Ground 1 is also the sole basis for the “handheld controller for providing at least one control signal to said video game” of claim 13. But Jaszlics does not disclose or render obvious such a handheld controller. The examples of Jaszlics of a mouse is not a handheld device, nor are the pushbuttons and joysticks described in Jaszlics, as they are mounted in a tank’s interior, and like other gauges and control devices are not handheld, and there would be no motivation for them to be handheld. And the obviousness argument regarding laser tag fails, as laser tag is not a video game, and in any event fails to remedy the fact that there is no motivation for handheld devices. All grounds thus fail to teach a “handheld controller for providing at least one control signal to said video game” (claim 13).

For these reasons, and those further discussed below, the Petition should be denied.

II. Technology Primer And Prior Art Problem

A. Virtual Reality

Virtual Reality devices are immersive technologies that enable users to experience digitally-rendered content in both physical and virtual space. VR systems may use head-mounted displays (HMDs) to block external images and provide a more immersive experience and can be used for entertainment and gaming. These technologies raise unique safety considerations, especially when users move around while wearing HMDs. In some cases, users may be at risk of colliding with real-world objects.

B. Prior Art Problems

The '476 patent identifies several problems with prior art VR systems. The patent explains that “Virtual Reality (VR) systems have been developed in which a user is provided with a non-transparent head-mounted display.” Ex. 1001, 1:16-18. “This display provides images to the user such that the user is immersed in a virtual, alternate reality.” *Id.*, 1:18-19. However, “[a] user cannot see his/her physical environment while immersed in such a virtual, alternate reality.” *Id.*, 1:19-21. Thus, “VR systems are deficient because a user cannot easily move around a physical environment while immersed in the virtual reality because a user cannot see his/her physical environment,” because “[i]f a user begins to physically move in his/her physical environment without being able to see his/her physical environment then

the user may trip, or bump into, a physical object (e.g., a rock or chair).” *Id.*, 1:21-28.

The prior art solution was that “a user is traditionally placed on a platform that is surrounded by padded safety rails. A user cannot move outside of this protected platform and moves through the virtual, alternate reality created by the VR system through the use of a manual joystick.” *Id.*, 1:29-34. An example of such a solution is depicted below:



However, “[s]uch a VR system is deficient because it severely limits the way that a user may interact with the virtual, alternate reality provided by the VR system.” Ex. 1001, 1:34-36. In such systems, the joystick, for example, “provides

the main control signal to a video game,” and “the main control signal controls the location of a video game character in a virtual world.” *Id.*, 1:39-42. “Such controls, however, are deficient because the controls require unnatural user movement to generate the primary control signal. It is therefore desirable to provide a primary control device that does not require unnatural user movement to generate a primary control signal to a video game.” *Id.*, 1:43-47.

The ’476 patent thus identifies that the prior-art VR systems presented both a problem—dangerous, unbounded gameplay whereby a user could come into contact with objects while playing—and an insufficient solution—highly physically constrained gameplay using physical safety rails that could still be collided with and led to unnatural movement requiring a joystick to move a character in a game. The ’476 patent proposes a better solution.

III. The Challenged Patent

The ’476 patent inventor designed a solution to the prior-art VR-gaming system problems that alleviates the mobility constraints associated with traditional systems, while still providing safety against obstacles. The patent describes a “location-based game system is provided in which a user’s physical position on a physical playfield . . . correlates to a video game character's location in a virtual playfield,” and thus “a video game character may be controlled without the need for a joystick.” *Id.*, 1:51-56.

The patent's solution to ensure that a user will not unintentionally run into objects while playing the game is to establish boundaries in a play space, limiting play to a "physical playfield," as recited in all challenged claims, rather than allowing user movement in unbounded space. Examples of such physical playfields include a "playmat," a "pre-determined area . . . of a military base," a "fenced-in backyard," a "soccer field," or "a basketball court." *Id.*, 2:58-61, 5:12-13, 11:53, 11:54, 14:16-17. The patent describes creating a mapping between a particular physical playfield and the virtual playfield to enable many of the system's key features, as depicted in Figure 3, showing the physical (actual) playfield on the left and the virtual playfield on the right:

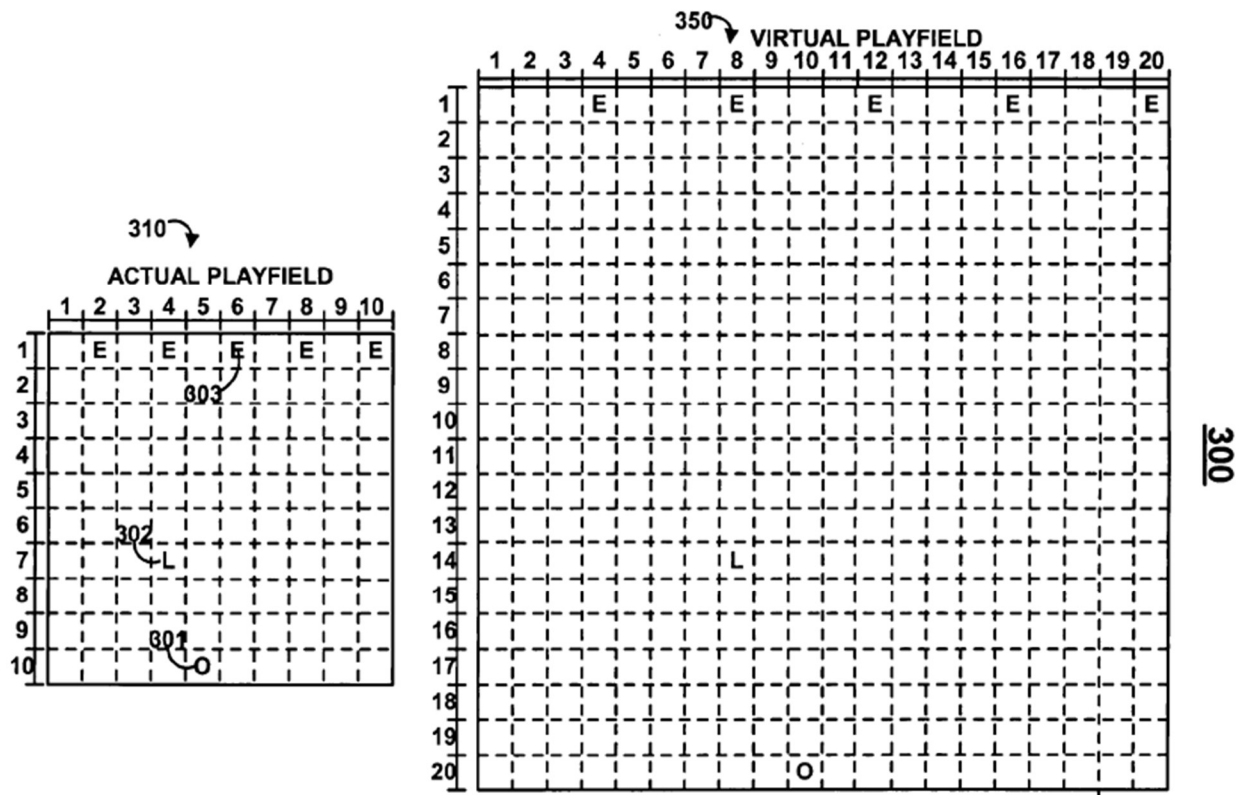


FIG. 3

Ex. 1001, Fig. 3. The patent further confirms that the playfield is bounded by explaining that “players may cho[o]se an actual playfield dimension from a variety of dimensions (e.g., 10 feet by 10 feet or 20 feet by 20 feet) and information may be stored according to these dimensions and transmitted to an intermediary (e.g., a database stored on a remote database).” *Id.*, 14:18-22. The patent describes collecting and storing a variety of information about the playfield and its boundary for use in the game:

Information about a playfield may include, for example, the parameters of the playfield, scaling information, and the status of the playfield

(e.g., where a particular user is located in an actual playfield and where a user is located in a virtual playfield). The information about a playfield may also include where actual objects are located (e.g., the areas of an actual playfield where impenetrable objects such as house or boulder are located). The information about a playfield may also include where virtual objects are located (e.g., the areas of a virtual playfield where a virtual sword or treasure is located).

Id., 11:61-12:4. “Such a playfield data structure may be used as the *primary information structure for the game* such that program logic refers to information in the playfield structure to determine game events (e.g., point scoring, deaths, level completions).” *Id.*, 18:27-31 (emphasis added).

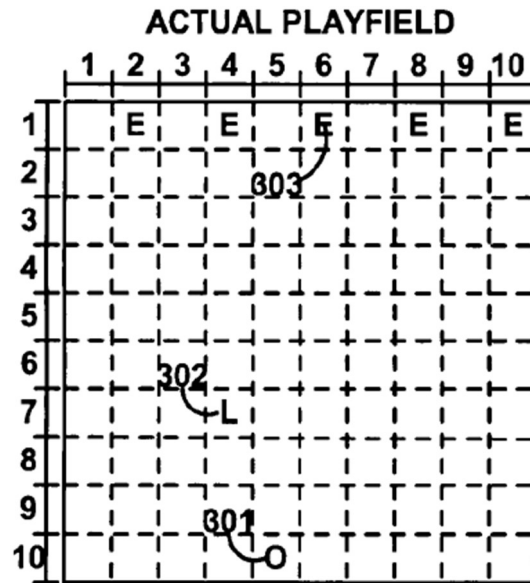
Importantly, the physical playfield boundaries need not be hard physical boundaries like the safety rails of the prior art, but are known to the system and can be conveyed to the user during gameplay, while a user still is able to move around the playfield without requiring a joystick to move the character. For example, when playing a “FROGGER” game, “[a]fter the user has completed a level (or dies), that user may be instructed to return to the origin position,” a functionality made possible by virtue of the system’s knowledge of the boundaries of the physical playfield. *Id.*, 3:16-18. For example, “[a] user therefore may start at origin O (noted on actual playfield 310 as position 10, 5 or information/location 301) and move up 3 feet and

to the left 1 foot to be at location L (noted on actual playfield 310 as position 7, 4 or information/location 302).” *Id.* 12:54-58.

Similarly, the bounded nature of the playfield solves the safety problems of the prior art in a better way than the prior art did, by enabling “event” activity, including warning a user when he or she is reaching a boundary of the actual physical playfield:

A playfield may also have event data (such as data E at location 1, 6 on playfield 310 or information/location 303). Event data may trigger an action if someone occurs at that event location, in relation to that event location, or in relation to the event data. For example, event data may be configured such that if a user (e.g., a manually controlled virtual character) enters location storing event data E, or location 303, an event occurs (e.g., the level is completed or the game develops in a particular way).

Id., 13:11-19.



Id., Fig. 3 (partial). As shown in the partial Figure 3 above, the event data E is located at a perimeter of the constructed playfield (e.g., “location 1, 6 on playfield 310 or information/location 303”; *id.*, 13:12). Also in reference to FIG. 3, the patent further describes that it can notify the user that he or she has reached the end of the physical playfield, and thus prevent the user from venturing into dangerous areas outside the playfield in which he or she might run into an object:

[A]ctual playfield matrix 310 (or a playfield matrix) may be utilized to store location information and operate the game . . . In this manner, a processor may periodically (or in real time) update the location of game objects or the status of the game (e.g., environment objects, enemy objects, and interactive objects) based on particular characteristics of the game. *For example, if, for any period or at any time, a user’s location corresponds to the location of an end object (as stored in*

actual matrix 310) then the game may determine that the game has ended and display associated graphics to the user by way of a display.

Id., 13:59-14:3.¹

The bounded nature of the physical playfield also enables scaling to the virtual world, a key feature. The patent states that “[g]enerally, locations on different playfields are scaled according to a relationship between the structure of the two playfields.” *Id.*, 12:65-67. This ability relies on the bounded nature of the actual playfield, such that “data may be stored on a matrix (or other data structure such as a database accessed by a memory pointer) corresponding to an actual playfield location (e.g., matrix location 7, 4)” and “[a]ctual playfield data (such as actual location information) may then be scaled and stored on a second playfield data structure (e.g., as location 14, 8 on a second matrix) such that, for example, a scaling functionality can be provided.” *Id.* 12:58-65. The scaling enables varied correspondence between physical and virtual playfields, which is useful, for example, for enabling different game modes and speeds, as well as multi-user gameplay where the users are playing in differently-sized physical playfields but the same-size virtual playfield. *Id.*, 8:61-65, 10:4-11, 11:46-55, 12:31-44, 14:4-37. The scaling factor can also be used in conjunction with known physical playfield

¹ All emphasis herein is added unless otherwise noted.

boundaries to reduce recurring errors; for example, “[i]n configuring the size of the playmat, and appropriately scaling the location-based game to the playmat, the amount of time before noticeable errors accrue can be manipulated . . . [A] number of location-based systems can be fabricated in which noticeable errors may never accrue.” *Id.*, 3:1-9.

Even without scaling, the bounded nature of the physical playfield is critical. For example, “[i]n a dedicated single player game with no scaling capabilities, for example, actual playfield matrix 310 (or a playfield matrix) may be utilized to store location information and operate the game . . . In this manner, a processor may periodically (or in real time) update the location of game objects or the status of the game (e.g., environment objects, enemy objects, and interactive objects) based on particular characteristics of the game.” *Id.*, 13:58-66.

Thus, by using a physical playfield, which as explained below is a “bounded physical play space,” the patented functionality provides a solution to the problem of a user’s movement during gameplay leading him or her to run into an object while avoiding the problems associated with the prior-art solution of using a confined platform with close safety rails for play, which precludes natural movement and requires a controller to move the character.

The challenged independent claims themselves capture the above-described features:

1. An augmented reality game system comprising:

a head-mounted display that overlays virtual indicia onto **a physical playfield**;

memory comprising video game logic that provides a video game;

a wearable processor that utilizes said video game logic to provide video game indicia to said head-mounted display based on said video game logic, wherein said processor is coupled to said memory and said head-mounted display;

a detector that determines landscape characteristics of said **physical playfield**, wherein said video game logic utilizes said landscape characteristics in providing said video game; and

a locating device that determines the physical location of said locating device on the **physical playfield**, wherein said video game logic utilizes the physical location of said locating device in providing said video game.

13. A system comprising:

a head-mounted display that overlays virtual indicia onto **a physical playfield**;

a processor that utilizes video game logic to provide video game indicia to said head-mounted display based on said video game logic, wherein said processor is coupled to said head-mounted display;

a detector that determines landscape characteristics of said **physical playfield**, wherein said video game logic utilizes said landscape characteristics in providing said video game;

a locating device that determines the physical location of said locating device on the **physical playfield**, wherein said video game logic utilizes the physical location of said locating device in providing said video game; and

a handheld controller for providing at least one control signal to said video game.

IV. The Proper Claim Construction

The Petition's section addressing claim construction asserts that the prior art cited renders the challenged claims obvious under any reasonable construction, and does not identify any terms for construction. Pet., 8. Patent Owner disagrees. Accordingly, relevant to the issues here, Patent Owner submits that the Board should construe the following term and limitation.

1. “physical playfield” (Claims 1, 13)

As described above in Section III, Patent Owner submits that the correct construction of the claimed “physical playfield” in claims 1 and 13 is a “bounded physical play space.” *See, e.g.*, Section III; Ex. 1001, 1:52-54, 2:58-61, 5:10-14, 11:46-55, 14:13-18. This construction follows from the intrinsic evidence and dictionary definitions.

As discussed in Section III, the specification makes clear that the play space must be a bounded space, *i.e.*, a physical playfield. The patent's goal of preventing a user from straying and accidentally running into an object, while still allowing enough freedom of movement to play the game naturally and without a joystick, is central to the invention and the meaning of the “physical playfield.” As explained in Section III, the bounded nature of a playfield is a central aspect of the patented solution, allowing the system to track a user within a particular space that can be made safe for play and allowing the system to notify the user when he or she is

straying outside of the safety of the playfield, as well as being instrumental in other core features, such as scaling to the virtual world for individual or multi-user gameplay, and location-based game actions that include reference to real-world boundaries. The detailed information about the playfield and its boundary is the “primary information structure for the game” and its use runs throughout the claims and specification. *Sequoia Tech., LLC v. Dell, Inc.*, 66 F.4th 1317, 1326 (Fed. Cir. 2023) (citing *Kaken Pharm. Co. v. Iancu*, 952 F.3d 1346, 1352 (Fed. Cir. 2020) (“A patent’s statement of the described invention’s purpose informs the proper construction of claim terms....”)); *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1308 (Fed. Cir. 2007) (“When a patent ... describes the features of the ‘present invention’ as a whole, this description limits the scope of the invention.”).

This definition also tracks other discussion of the physical playfield in the specification beyond what is described above. For example, the physical playfield is described as being “constructed” so that it can be scanned, *e.g.*, “FIG. 13 is an illustration of pre-scanning *a physical playfield constructed in accordance with the principles of the present invention*”:

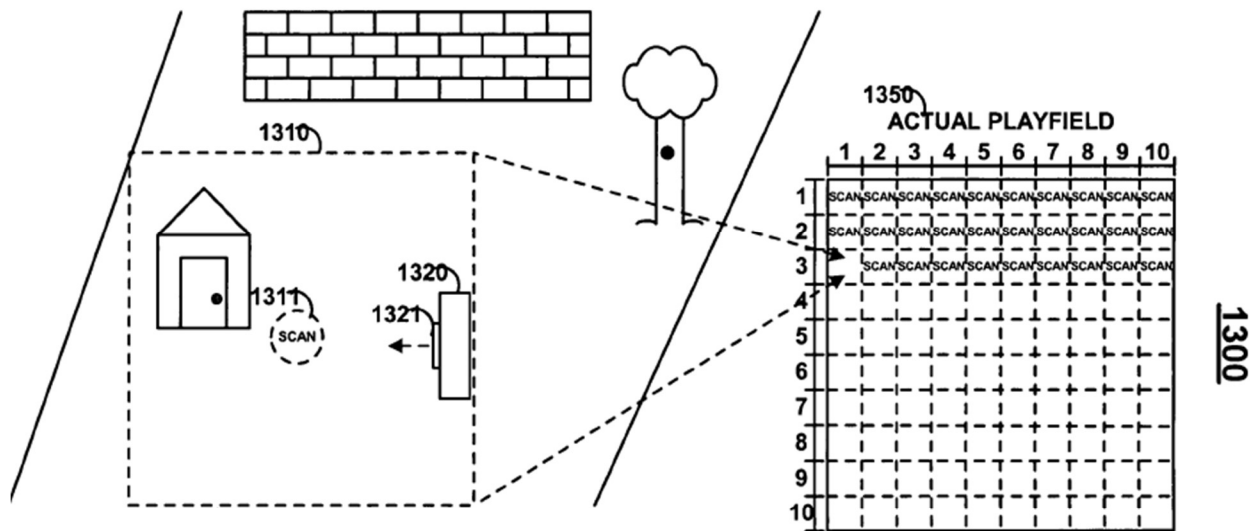


FIG. 13

Ex. 1001, 6:30-32, Fig. 13. Figure 3 similarly describes the process of “scaling a virtual playfield to *a physical playfield constructed in accordance with the principles of the present invention.*” *Id.*, 5:63-65.

Moreover, additional context within the claim language indicates the claimed physical playfield is bounded. Both challenged independent claims require “a locating device that determines the physical location of said locating device *on* the physical playfield.” *Id.*, 22:5-6. The fact that the claims refer to a location *on* the physical playfield implies that there is some space in the world that is *off* the physical playfield. The whole, unbounded world therefore cannot be the claimed physical playfield as Petitioner’s invalidity arguments incorrectly imply.

Dictionary definitions also support Patent Owner’s construction. For example, Merriam-Webster’s Collegiate Dictionary defines “playing field” as “a field for various games; *esp* the part of a field officially ***marked off for play***.” Ex. 2001, p.3. Similarly, The Chambers Dictionary defines “playing field” as “a grass-covered space ***set apart, marked out***, and kept in order for games.” Ex. 2002, p.3. The Dictionary of Architecture & Construction defines “playfield” as “[a]n area ***designed*** for field games.” Ex. 2003, p.3. Similarly, Webster’s Third New International Dictionary defines “playfield” as “a playground ***designed*** for outdoor athletics and games.” Ex. 2004, p.3.

The Petition cites to the phrase “the physical world, a physical environment, or a defined physical playfield” to imply that the claimed “physical playfield” may be unbounded, *i.e.*, the *entire* physical world and/or an unbounded space surrounding the user. Pet., 16-17. Petitioner is incorrect. The distinction drawn in the examples cited above is not that some are bounded and some are not, as the Petition implies. The distinction is that some are in the physical world (*e.g.*, marked pieces of land such as a backyard) and some are defined playfields (*e.g.*, a playmat). A playmat is defined in that without user or system action, it has a specific dimension or occupied area. It may contain, for example, predefined “knowledge of the origin location (*e.g.*, the ‘START location’)” and an “‘END’ location” for playing a game. Ex. 1001, 2:55-61, 3:14-16, 9:4-9. Further, a defined playfield, such as a playmat “may

be representative of [a] single game” and “playmats may be distributed with game system 101 in kits.” Ex. 1001, 2:32-36, 8:45. In such a case, the playmat “may include indicia similar to environment indicia in a particular game”; “[f]or example, if a game on game system 101 has a water component and a land component, playmat 1450 may have indicia of a water component (e.g., indicia 152) and land component (e.g., indicia 151).” *Id.*, 8:31-38. Further, it “may be sized according to the characteristics of a game”; for example, “if a user has to move 5 feet to cross the land component on a level of a game provided by game system 101 then the land component of playmat 150 may be 5 feet long.” *Id.*, 8:32-44. For example, the patent depicts playmat 150 in Figure 1, with some of the described features that make it a “defined” physical playfield, such as start 170, land indicia 151, water indicia 152, and end 160:

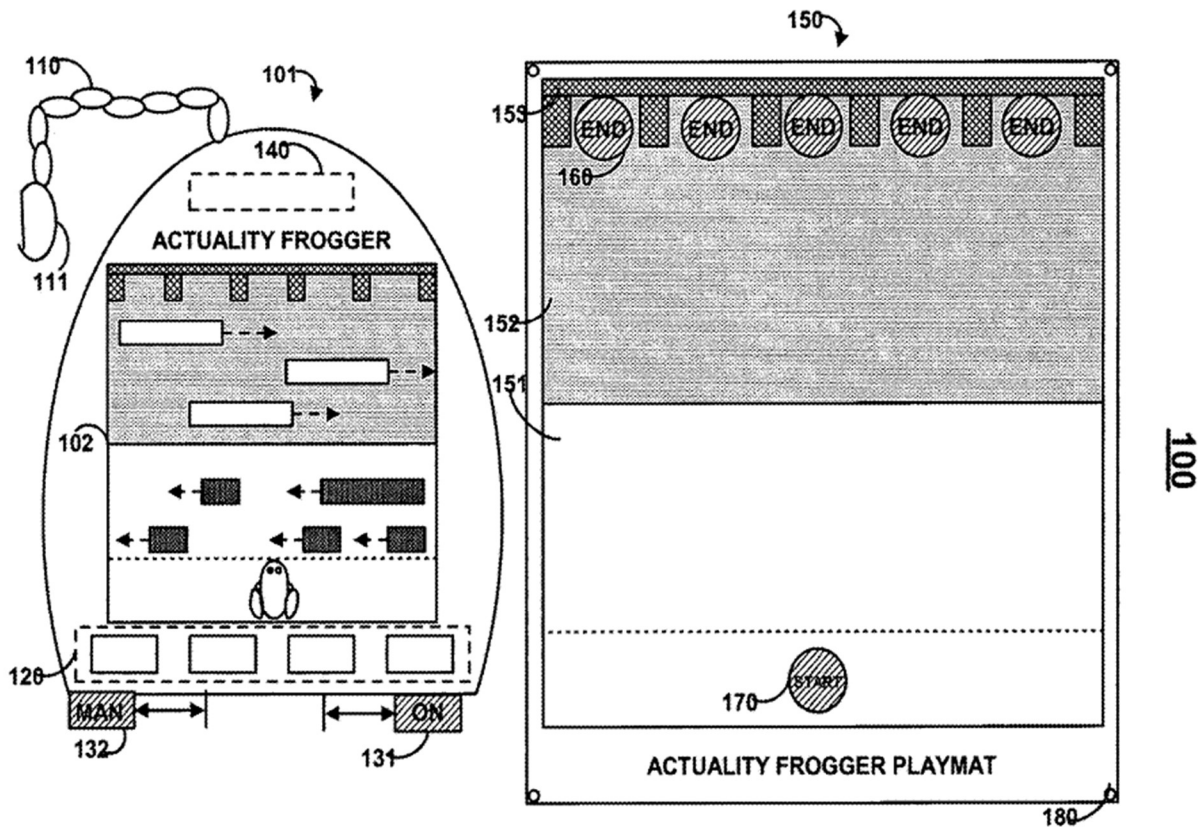


FIG. 1

Id., FIG. 1, 8:35-38.

Likewise, the playfields in the “physical world” and “physical environment” examples in the quotation the Petition relies on have boundaries, albeit other methods are used to determine the boundaries and relevant parts of the playing space that will be important for the game. For example, “the landscape of a pre-determined area (e.g., a particular square area of a military based) may be scanned at a point before a game is played. Virtual objects may be generated using this scanned information that corresponds to physical objects. Such a process may be utilized

when the landscape is being scanned as a game is playing.” *Id.*, 5:11-17. In other embodiments, a user must manually enter environmental data. *Id.*, 19:60-20:22.

Patent Owner reserves the right to identify additional terms needing construction should the Board grant institution.

V. The Petition

The Petition relies exclusively on prior art that uses only the prior-art approach and does not disclose the patented invention. The asserted grounds are below:

Ground	Claims	Basis for Challenge under §103
1	1, 4, 5, 13	Jaszlics (EX1003) in view of Piekarski (EX1004)
2	2	Ground 1 Prior Art + Morihira (EX1006)
3	4	Ground 1 Prior Art + Ohshima (EX1005)
4	6-7	Ground 1 Prior Art + Robarts (EX1007)
5	17	Ground 1 Prior Art + Muendel (EX1008)

Pet., 1. Only Ground 1 regards the challenged independent claims, which are 1 and 13, and will be focused on below. Grounds 2 through 5 merely tack on references for the purposes of dependent claims but do not alter anything about the analysis of claims 1 and 13.

A. Jaszlics

Jaszlics describes a system using “virtual masking objects” derived from range data to better “combin[e] virtual images with real-world scenes,” using

stationary, non-wearable “virtual masking object (VMO) generation software running in a virtual simulation computer 210 (e.g., a personal workstation running two 266 MHZ Pentium II processors).” Ex. 1003, Title, 14:14-18.

Jaszlics fails to disclose a physical playfield. There is no description of any boundary of a physical space to be used for any reason in Jaszlics. Instead, the system is intended to operate in unbounded space, allowing the user to go wherever he or she wants, without any restriction, and there is nothing in Jaszlics that warns the user when he or she is nearing any boundary, or otherwise uses physical boundary information. Further, as the user moves, the system operates on whatever the scanner can see at a given time, thus confirming the use of the system is not restricted to any bounded space: “A range scanner determines the shape and distance of real-world objects within a field of interest to the observer using the apparatus.” Ex. 1003, Abstract; *id.*, 2:21-27, 2:39-44, 5:14-19 (“For dynamic scenes with a moving observation point and mobile elements within the real-world scene, the system will normally require considerably higher range scanning pulse rates, such as 30 KHz, and a range frame update rate for the field of regard in the order of 1 Hz or higher.”), 11:30-47 (“Changes in the position and orientation of the observer, of a vehicle housing the observer, or of movable elements of the vehicle (e.g. a tank’s turret) as sensed by the observer’s sensors and controls are processed by the observer state and action processing step . . . Changes in the head position of the observer in

some implementations of the invention will control the optical axes of the video camera and range scanner, to ensure that scanning and real-world scene acquisition coincides with the observer's current field of view."), 4:35-47 ("range scanner 101 determines the distance of the entities present in a real-world scene 102 . . . seen from a momentary observation point."), 10:29-31 ("[t]he observer's interactions with the real world also include the movement of the observation point."), 6:45-46 ("the origin of the coordinate system [is] located at the observation point of the user."), 9:23-24 ("The observer 146 using the optical device will see the virtual image over the whole field of view of the real-world image.").

The Petition argues "Jaszlics teaches that the 'electronic display goggles' or 'visors' ('head-mounted display') 'overlay[] virtual indicia onto a physical playfield,' by for example, displaying virtual tanks ('virtual indicia') overlaid within **a physical landscape surrounding the user ('physical playfield')** for participating in a virtual war games exercise, as illustrated in Figure 1." Pet., 17. The amorphous "real-world scene . . . seen from a momentary observation point" surrounding the user as they move is not a bounded space and is therefore not a physical playfield. The Petition then copies this image from Jaszlics confirming this:

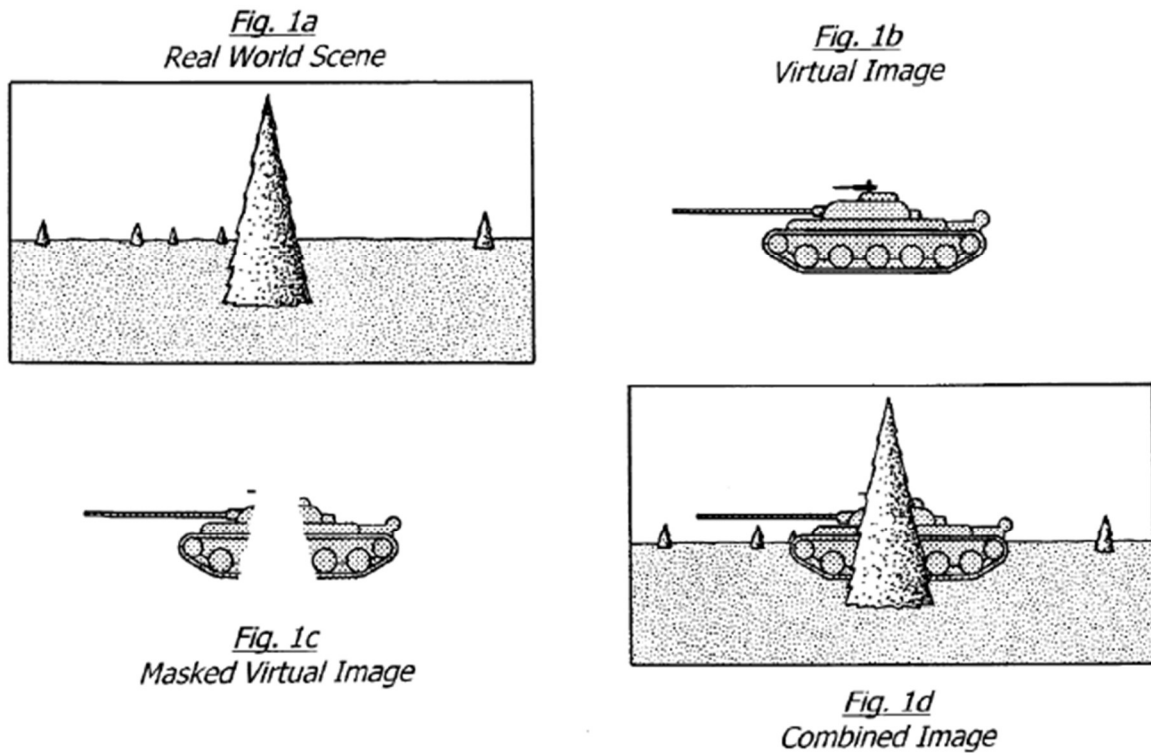


Fig. 1

Ex. 1003, Fig. 1. Thus, as made clear from the reference and the Petition’s characterization of it, there is no physical playfield. The device is intended to be used in unbounded space and the system processes whatever the user can see, wherever the user may go.

Moreover, Jaszlics expressly states that the user is intended to move during the game, further emphasizing that the playing space is unbounded. *Id.*, 10:29-31 (“[t]he observer’s interactions with the real world also include the movement of the observation point”); *see also* 6:45-46 (“the origin of the coordinate system [is] located at the observation point of the user”).

It is worth noting that although Jaszlics mentions that “virtual players, objects, and special effects can be combined with real players and real objects in the playing field,” *Id.*, 1:64-67, as noted above the play space in Jaszlics is not a bounded space. The term “playing field” is only mentioned a single time in the reference and, read in the context of Jaszlics, it merely means the playing “field of view” or “field of regard” that is unbounded because Jaszlics expressly states it changes as the user moves and encompasses whatever the scanner at the user’s location can see, wherever the user goes, and further, Jaszlics fails to teach or enable any mechanism whereby its system could establish boundaries for play. *Id.*, 1:22, 2:25-26, 2:43, 3:37, 4:41, 4:67, 5:10-11, 5:17-18, 5:30, 7:53, 8:61-62, 9:24, 9:55, 11:47, 17:22, 18:9, 18:22, 18:32; *id.*, Table 7; *id.*, Claims 1-6, 8, 12-18, 20, 22, 24, 26, 28.

Without constructing such a bounded physical playing space, the system of Jaszlics fails to ensure user safety and would be unable to accomplish any of the functionality reliant on the physical playfield in the ’476 patent, including in the claims, as described above, and falls squarely into the prior art approach of an unbounded playing space.

Thus, Jaszlics simply combines virtual images with real-world scenes, without providing any teaching of a system that constructs or uses a physical playfield.

B. Piekarski

Piekarski is titled “Integrating Virtual and Augmented Realities in an Outdoor Application,” Ex. 1004, Title. Petitioner relies on Piekarski’s discussion of outdoor augmented reality systems. Pet., 10, 20-23, 28-33. With regard to the AR systems described in Piekarski, the initial motivation behind the systems was to provide users with “a wearable computer to support navigational tasks, since navigation is an essential and time-consuming task for soldiers on foot.” Ex. 1004, p.7. This was accomplished with the “advent of wearable computers and lightweight head-mounted displays (HMDs) [which have] made augmented reality applications feasible outdoors.” *Id.*, p.6. Like the system of Jaszlics, the AR system of Piekarski is designed for use in large, open, and unbounded physical environments. The reference repeatedly emphasizes that the technology is intended to operate in real-world scenes that are not confined or structured, but instead span broad, undefined outdoor spaces. *Id.*, p.7 (“the AR user’s outdoor view”); *see also id.* (“[o]ur previous work has demonstrated AR systems functioning as powerful navigation and visualisation tools”).

This is consistent with the Petitioner’s allegations. Specifically, in arguing that the system of Piekarski “overlays virtual indicia onto **a physical playfield**” it alleges that “Piekarski discloses a wearable, outdoor augmented reality computing system in which virtual indicia are ‘overlaid’ on a ‘**physical world view.**’” Pet., 20.

But a “physical world view” is not a physical playfield, as it is not bounded, just as in Jaszlics.

Petitioner depicts Figure 3 of Piekarski, provided below as illustrating the wearable computer system, including head-mounted display.



Figure 3. Users of the wearable computer see through a Sony PLM-100 transparent head-mounted display and enter commands on a Phoenix forearm keyboard.

Ex. 1004, Figure 3; Pet., 21.

To the contrary, Piekarski overtly contrasts their system with prior AR systems, disclosing that, “[m]any of the existing applications of AR . . . are characterised by requiring precise tracking in small operating regions.” Ex. 1004, p.6. Piekarski differentiates from such existing applications, describing that “[t]he initial application that we investigated was the use of a wearable computer to support navigational tasks, since navigation is an essential and time-consuming task for

soldiers on foot. The significance of the navigation application lies in its *departure from tracking users in small operating regions.*” *Id.*, p.7.

Moreover, as in Jaszlics, the user is intended to be moving in this unbounded space, thus changing the field of view and further making clear that the operating space is unbounded and is not a physical playfield. *Id.*, p.8 (“as wearable users move, their GPS systems continue to provide real-time positional data to command personnel”), p.9 (“[a] TCM2 3-axis digital compass, also attached to the display, allows the computer to determine exactly how the wearer’s head is oriented relative to the surface of the Earth. This information is used to render the display so that it remains in correspondence with the user’s physical world view”).

Thus, as with Jaszlics, Piekarski is incapable of addressing safety concerns and mobility constraints of traditional VR systems described in the ’476 Patent and achieving the claimed solution.

Thus both references in Ground 1, Jaszlics and Piekarski, alone or in any combination, fail to provide any teaching of a system that constructs or uses “a physical playfield,” as claimed in all challenged claims.

VI. Board Should Deny Institution Because The Petition Does Not Establish The Required Reasonable Likelihood of Success

This preliminary response presents three main reasons the grounds fail. All focus on the challenged independent claims (claims 1 and 13), and Ground 1.

Grounds 2-5 simply add references to the Ground 1 combination in an attempt to address dependent claims, and do nothing to change or add to the independent claim analysis, as explained below, and so they fail for the same reasons as Ground 1:

Ground	Claims	Basis for Challenge under §103
1	1, 4, 5, 13	Jaszlics (EX1003) in view of Piekarski (EX1004)
2	2	Ground 1 Prior Art + Morihira (EX1006)
3	4	Ground 1 Prior Art + Ohshima (EX1005)
4	6-7	Ground 1 Prior Art + Robarts (EX1007)
5	17	Ground 1 Prior Art + Muendel (EX1008)

Pet., 1.

The first reason the Petition fails is that Ground 1 fails to disclose or render obvious a “physical playfield,” which applies to both challenged independent claims (claims 1 and 13) and thus all challenged claims, for all grounds. The second reason the Petition fails is that Ground 1 fails to disclose or render obvious a “wearable processor,” which applies only to independent claim 1 and its dependent claims (claims 2, 4, 5-7), for all grounds. The third reason the Petition fails is that Ground 1 fails to disclose or render obvious a “handheld controller,” which applies to only to independent claim 13 and its dependent claim (claim 17), for all grounds. Thus, for each challenged claim, there are at least two reasons why all grounds fail. The Petition should therefore be denied.

A. The Grounds Fail To Disclose A “Physical Playfield” (Claims 1, 13)

1. Ground 1

As discussed above in Section V, both Jaszlics and Piekarski, which are relied upon for Ground 1 describe systems that lack a physical playfield, which is required in all challenged claims. Thus, Ground 1 fails.

2. Ground 2

In Ground 2, Petitioner adds Morihira to “Ground 1 Prior Art” to attempt to address dependent claim 2 but does not use Morihira for anything in claim 1, including the “physical playfield.” Pet., 3, 49-51. Thus, Ground 2 fails for the same reasons as Ground 1.

3. Ground 3

In Ground 3, Petitioner adds Ohshima to “Ground 1 Prior Art” to attempt to address dependent claim 4 but does not use Ohshima for anything in claim 1, including the “physical playfield.” Pet., 3, 54-57. Thus, Ground 3 fails for the same reasons as Ground 1.

4. Ground 4

In Ground 4, Petitioner adds Robarts to “Ground 1 Prior Art” to attempt to address dependent claims 6 and 7 but does not use Robarts for anything in claim 1,

including the “physical playfield.” Pet., 3, 59-67. Thus, Ground 4 fails for the same reasons as Ground 1.

5. Ground 5

In Ground 5, Petitioner adds Muendel to “Ground 1 Prior Art” to attempt to address dependent claim 17 but does not use Muendel for anything in claim 1, including the “physical playfield.” Pet., 3, 71-72. Thus, Ground 5 fails for the same reasons as Ground 1.

B. The Grounds Fail To Disclose “A Wearable Processor” (Claim 1)

The Petition relies on Piekarski to supplement Jaszlics as to the claim limitation “a wearable processor,” which the Petition concedes is missing from Jaszlics, as to claim 1. Pet., 16-22, 24-33, 47-49. But there is no motivation to combine, and thus the Petition fails in all grounds to render obvious claim 1.

1. Ground 1

a. The Proposed Combination

The Petition argues that “[i]t would have been obvious to a person of ordinary skill in the art to combine Piekarski’s teachings regarding a body-worn wearable computer for an augmented reality system with Jaszlics.” Pet., 30. As to the specific modification, the Petition states: “The combination would have involved the straightforward substitution of Jaszlics’ computer system with the wearable computer system disclosed in Piekarski and would have predictably resulted in

Jaszlics' virtual simulation system in which the computer providing the virtual simulation for a user was worn by the user." *Id.*, 30-31.

As the Petition concedes, Jaszlics does not have a body-worn computer system. Pet., 27. The only "computer system" in Jaszlics, which is proposed to be removed in the combination, is the stationary workstation that provides the virtual simulation for the user. Thus, the alleged modification in the Petition is: (1) to remove the stationary computer system that generates the virtual simulation in Jaszlics and replace it with "the wearable computer system disclosed in Piekarski," which (2) would allegedly result in "the computer providing the virtual simulation for a user [being] worn by the user." *See* Pet., 30-31.

The alleged reason to move the processing that provides the simulation from a stationary workstation onto the user-worn device, allegedly as disclosed in Piekarski, is "increased mobility and interaction as a result of being untethered to a stationary computing system." Pet., 31.

***b. The Proposed Combination Is Non-Functional And
Has No Support In Jaszlics or Piekarski***

Piekarski does not disclose a "system in which the computer providing the virtual simulation for a user [is] worn by the user," as would allegedly result from the combination of Jaszlics and Piekarski, nor does the Petition allege it does. As further explained below, in Piekarski, the stationary VR workstation, which is not a

part of the proposed combination, provides the virtual simulation. Pet. 30-31. The wearable computer system, the only part of Piekarski used in the combination, simply relays that simulation to the user. *Id.*

Thus, the combination fails for two reasons. First, the combination would not function because there is nothing to create the virtual simulation or any virtual items to be overlaid as required for the references to function. In the combination, Jaszlics's computer system, which creates the virtual simulation in that reference, has been removed, and the only thing used in its place is the *mobile computer system* of Piekarski, which does nothing to generate a virtual simulation. Second, the references fail to provide disclosure for the proposed combination wherein a computer worn by a user provides a virtual simulation, as neither Jaszlics nor Piekarski discloses such a computer.

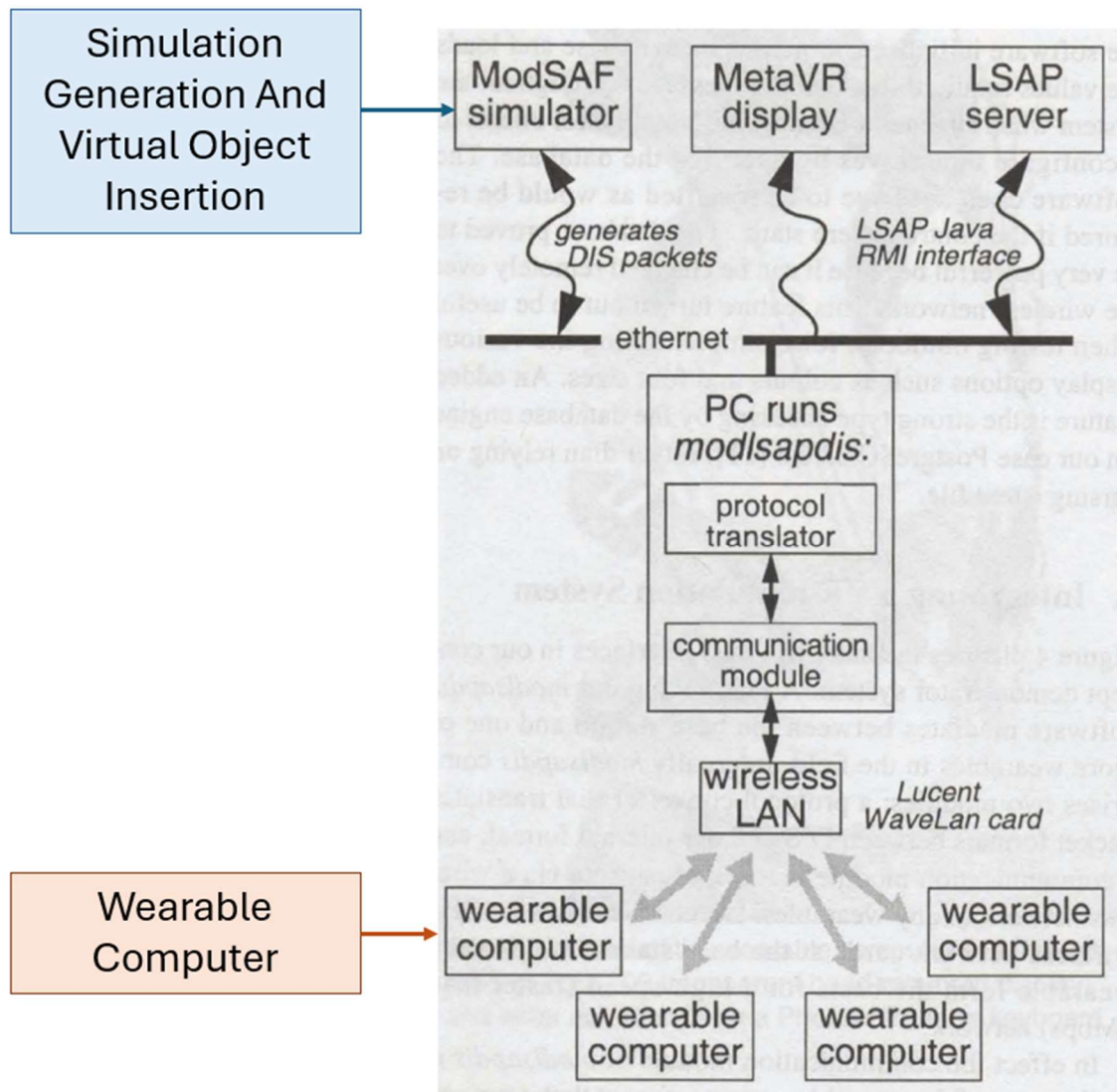
In Piekarski, there are at least two computers: (1) the laptop worn by the mobile AR user, and (2) the “stationary” VR workstation computer. Ex. 1004, p.6 (abstract), p.7 (first full paragraph). The AR user's equipment, including a laptop—which, as quoted above, is the computer relied on in the proposed combination with Jaszlics—is intentionally kept light, and its focus is to present a heads-up display for the user. *Id.*, p.9. For example, it lacks a camera and so it cannot create the virtual simulation itself. *Id.*, p.7-9 (“the AR user carries no video camera”). The stationary VR workstation computer, by contrast, is what the Petition calls the “computer

providing the virtual simulation for a user.” Piekarski explains that because the AR user does not carry a video camera, the stationary VR computer uses “a three-dimensional database of the outdoor environment” and “draw[s] an avatar at the appropriate location,” and when the *VR system* “insert[s] an object into the virtual world, an iconic representation of that object would appear overlaid on the AR user’s outdoor view”; the system explicitly “is able to exploit the large computing power of the *VR system* without affecting the computing requirements of the wearable AR systems”:

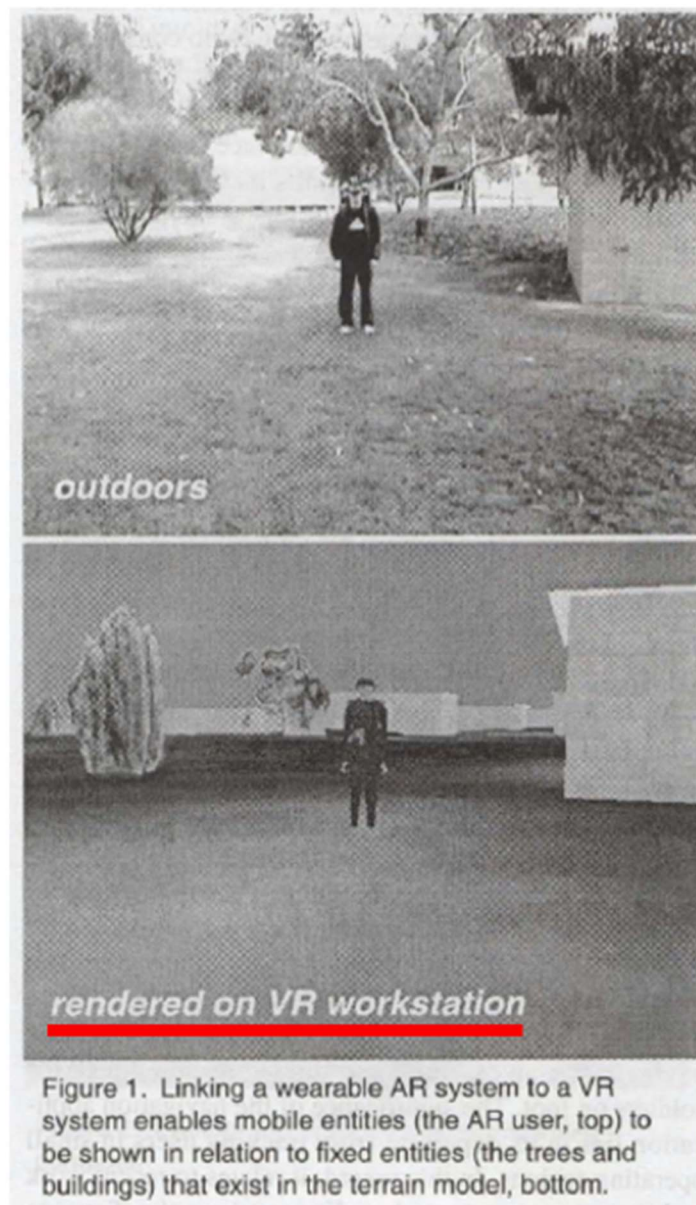
each other. Since the AR user carries no video camera, the VR system must rely on a three-dimensional database of the outdoor environment in order to place the AR user in it. The wearable computer transmits its GPS position so that the VR system can draw an avatar at the appropriate location. Now if the VR user were to insert an object into the virtual world, an iconic representation of that object would appear overlaid on the AR user’s outdoor view. We are therefore able to exploit the large computing power of the VR system, without affecting the computing requirements of the wearable AR systems.

Id., p. 7. The AR user’s wearable system is not described as generating any aspect of the virtual simulation or any virtual objects, data, or indicia. Instead those are done on the stationary VR workstation: “The Synthetic Environment Research Facility (SERF) in DSTO’s Land Operations Division employs ModSAF to generate synthetic battle environments in simulated exercises” (Ex. 1004, p.7); “The main

objective of the system was to demonstrate the possibility of a dismounted soldier interacting with information from remote simulation and situational awareness systems (ModSAF and LSAP) using AR techniques” (Ex. 1004, p.8); “in a training application the icons may represent the positions of dismounted forces generated by the ModSAF simulator at SERF” (*Id.*). This is also depicted in Figure 4 of Piekarski:



Ex. 1004, Fig. 4 (annotated). Further, the stationary VR workstation is what “render[s]” the virtual simulation:



Ex. 1004, Fig. 1.

The AR system the user carries in Piekarski simply relays the information to the user; it does not provide any aspect of the simulation or any virtual object to be overlaid. Thus, there is nothing in the proposed combination that provides technical disclosure for a computer providing the virtual simulation to be worn by the user.

Moreover, if somehow there was some aspect of the virtual simulation “provided” by the wearable equipment (which there is not), the even more fundamental problem with the combination is that there is nothing to create the virtual simulation, or any aspect of it, in the first instance. In the combination, Jaszlics’s computer, which creates the simulation in that reference, has been “substitut[ed]” with only the wearable equipment in Piekarski, which does not perform any virtual simulation or any virtual object generation, as explained above.

Further, there is not even any camera in Piekarski to run Jaszlics’s simulation, which relies heavily on cameras (Ex. 1003, 8:53-9:47, 12:1-18), as the AR equipment in Piekarski has none, nor does any other equipment described in the reference. Ex. 1004, 7.

Thus, even more fundamentally than failing to disclose the features of the alleged combination (“the computer providing the virtual simulation for a user [being] worn by the user”), the alleged combination is entirely non-functional for several independent reasons and fails.

If Petitioner were to try to argue that (even though it is nowhere in the Petition and thus would be improper new argument) everything in Piekarski, both the AR and VR systems, could be moved into the body-worn computer, there is no technical basis for that and it flies in the face of Piekarski itself, which explains that at the time, higher-end processing done by the VR user's system — which is described as having “large computing power,” similarly to that of Jaszlics, was *not* appropriate for being moved into the portably AR user's system. Ex. 1004, p.6-9.

c. Even If Piekarski Did Operate As The Petition Assumes, There Is No Motivation To Combine Because Jaszlics's High Performance Demands And Corresponding Hardware Requirements Were Not Suitable For Body-Worn Equipment

If somehow Petitioner were correct about Piekarski's disclosure and the virtual simulation were provided by the user-worn equipment, motivation to combine would still be lacking. Jaszlics and Piekarski describe fundamentally different approaches, to different problems, and their design approaches are opposite and incompatible. This is especially the case if Petitioner's characterization of Piekarski were correct (which it is not, as explained in the section above).

The problem that is addressed in Jaszlics is that:

Conventional virtual reality systems generate a field of view for the user that is either completely computer-generated, or may include real-world scenery as background . . . however, conventional virtual reality systems do not typically incorporate

virtual images into real-world scenes due to the difficulties of integrating a virtual image into a real-world scene in a realistic manner.

Ex. 1003, 1:22-31. The solution provided by Jaszlics emphasizes the use of high-fidelity environmental scanning using long-range scanners to “determine[] the shape and distance of real-world objects within a field of interest.” *Id.*, Abstract; *see also id.*, 12:19-22 (“[t]he laser scanner 203 is a modification of a commercially available solid-state infrared surveyor’s ranging laser, operating at 905 nanometer wavelength, sending out 40 nano-second repeated laser pulses at 47 wafts peak power.”). Jaszlics uses range scanners that can have a range of “1000 meters,” and “three dimensional radar scanning for longer ranges (multiple kilometers).” *Id.*, 4:42-43, 4:62-64. The system then generates “virtual masking objects” and “[i]mages of the virtual entities and the virtual masking objects are combined into masked virtual images . . . presented in an electronic or optical display.” *Id.*, 2:46-56. To accomplish this functionality, Jaszlics describes the hardware required, describing that “[v]irtual masking object generation is presently implemented by . . . software running in a virtual simulation computer 210 (e.g., a personal workstation running *two* 266 MHZ Pentium II processors).” *Id.*, 14:14-18.

A POSITA at the time would not have understood that such high-end, high-capacity, substantial hardware is suitable to be worn by a user. Moreover, majority

of the embodiments discussed in Jaszlics involve the user being inside a tank, with the screen being displayed in the tank. *Id.*, 10: 11-22 (“[t]he observer 113 of the display . . . would observe and track the virtual opponent embedded in the real-world scene through the tank’s actual gun sight.”). There is no motivation to convert the tank-based system to a portable wearable system. If Jaszlics had thought it feasible, it would have done so, but neither the goals of the system nor the technical requirements led to a desire or capability to do so. Although Jaszlics states that “can be used with electronic display goggles,” there are few details and it is clear that such goggles are merely a replacement for the display, but do not indicate a desire for increased portability, wearability of processors, or the decreased computing power necessary to make the system wearable. *Id.*, 2:5-13. And even in other applications described in Jaszlics besides the tank-based one, such as aircraft simulation (*id.*, 1:60-67) or “the area of entertainment in the high-speed generation of special effects and three-dimensional displays” (*id.*, 2:1-5), or “inserting virtual elements into films,” or “as an aid showing the potential effects of reconstructive surgery or dental work” (*id.*, 18:52-58), the emphasis always continues to be on high-end processing, and not portability.

In contrast, Piekarski’s AR wearable system is intentionally minimalist. The AR system of Piekarski is designed to operate without cameras or range scanners, and is optimized for portability and low computational overhead — the reference

specifically states “the AR user carries no video camera.” Ex. 1004, p.7. Its wearable computer is not intended to support the type of intensive data processing required by Jaszlics. Piekarski’s design choices reflect a deliberate trade-off to enable outdoor, mobile AR applications without the burden of high-performance computing. And the user is already fully burdened with a laptop and other equipment — there is no indication that, or explanation from Petitioner why, Jaszlics’s two-processor workstation desktop computer would be suitable to be carried by the user in Piekarski, which would hardly be appropriate for a soldier in a training mission:



Ex. 1004, p.8.

A POSITA would have had no reason to combine Piekarski's teachings regarding a lightweight, portable, body-worn wearable computer for an AR system with the system of Jaszlics. The proposed modification to substitute the robust, hardware-intensive computer system of Jaszlics with the camera-less wearable computer system of Piekarski would not be a predictable or rational design choice

for a person of ordinary skill in the art, but rather a fundamental redesign that contradicts the core objectives of Jaszlics.

d. Jaszlics’s Camera-Based System Using an Opaque Display Is Not Compatible With Or Analogous To Piekarski’s Camera-Less 3D-Data-Based Transparent-Screen Approach

The alleged combination is non-functional for another reason as well: Jaszlics’s system is entirely camera-based and relies on real-world video feed to provide its functionality. For example, “[i]n this step 110 of FIG. 2, the virtual images constructed in the virtual image generation step 109 are combined with the real-world image 114 originating from the video camera 100.” Ex. 1003, 8:53-9:47; *see also id.*, 12:1-18. It simply cannot function without a camera.

But Piekarski is entirely camera-less, instead relying on 3-D environment information known ahead of time: “Since the AR user carries no video camera, the VR system must rely on a three-dimensional database of the outdoor environment in order to place the AR user in it.” Ex. 1004, p.7.

The Petition makes no attempt to reconcile these differences or explain how the system of Jaszlics would work without a camera or what modifications would be needed. Pet., 30-33.

And if the purported combination would hypothetically not need a camera because it would use the “three-dimensional database of the outdoor environment”

contained in the VR workstation computer in Piekarski, that computer is not a part of the alleged combination, as explained above. Thus, there would be no information about the world on which to base the operations of the system without a camera and without the VR system database.

Again, the alleged combination would be non-functional.

Moreover, due to the substantial differences in the way the references operate, a POSITA would not look to Piekarski to modify Jaszlics, as it uses a completely different design and any modification would require wholesale change to the entire system for no alleged or discernable benefit. This is true not only because of the above differences in how the world is perceived (camera versus known 3-D model), but also how the information is displayed to a user. As explained above, Jaszlics displays a real video feed to a user on an opaque screen. This is not merely a display choice—it is a core architectural requirement of the system. As Jaszlics explains: “The masked virtual images and the real-world scene are combined and displayed in such a manner that the virtual images appear to be obscured, when appropriate for their simulated location relative to real-world objects.” Ex. 1003, 2:32-37. This masking effect is achieved by using range data to generate virtual masking objects, which are then rendered in a digital scene and composited with the video feed of the real world. *Id.*, 2:44-46 (“Virtual masking objects, which are simplified computer models of real-world objects, are derived from the range data.”), 8:53-55

(“[T]he virtual images constructed in the virtual image generation step 109 are combined with the real-world image 114 originating from the video camera.”). The system’s ability to realistically occlude virtual objects behind real-world features depends entirely on having a pixel-by-pixel representation of the real-world scene—something it performs using a video-based display pipeline, with no explanation from the Petition about how it could be performed otherwise. *Id.*, 6:20-23 (“The virtual masking objects *must* be rendered with display attributes that permit the automatic replacement of their pixels in the image combination step with a video background representing the external world.”).

Piekarski, by contrast, uses the “Sony PLM-100 transparent display” to allegedly overlay virtual indicia on top of a direct view of the “real world” (not a video feed of the real world). Pet., 21; Ex. 1004, p.9. This approach is incompatible with Jaszlics’s masking technique, which requires a video of the real-world scene to properly obscure the virtual objects mixed in to the combined image. Ex. 1003, 15:66-67 (“[i]mage combination is implemented through the video mixer.”), 16:13-17 (“[t]he video image shows up as the background image . . . This results in the combined reality scene showing virtual entities in the real world, the objective of the invention.”). Substituting a see-through HMD into Jaszlics’s system would eliminate the video feed of the real world, thereby removing the very input that Jaszlics’s masking and compositing algorithms require. Ex. 1003, 6:20-23 (“[t]he

virtual masking objects *must* be rendered with display attributes that permit the automatic replacement of their pixels in the image combination step with a video background representing the external world”). Without a captured image of the real-world scene, Jaszlics’s system cannot generate the “combined image” that is central to its operation. *Id.*, 8:53-55 (“the virtual images constructed in the virtual image generation step 109 are combined with the real-world image 114 *originating from the video camera.*”). This is not a mere design preference—it is a functional dependency. The Petition’s assertion that the combination would have “predictably resulted” in a transparent HMD system thus ignores the fact that such a substitution would disable the core functionality of Jaszlics’s invention. Pet., 22. Even if one were to consider combining the two systems, there is no articulated rationale in the Petition for why a person of ordinary skill in the art would have been motivated to replace Jaszlics’s video-based display with an optical see-through HMD, especially when doing so would negate the system’s ability to perform realistic occlusion and compositing.

The Petition argues that the word “goggles” and “visor” in Jaszlics imply a transparent display. Pet., 22. Not so. There is no indication that the display is transparent, and a POSITA would interpret the “goggles” and “visor” as not being transparent, as their purpose is to display a video feed of the real world, not to allow visibility through the screen to the real world.

Jaszlics with Piekarski take opposite approaches and modification of Jaszlics with Piekarski would require a complete redesign of the entire system for no benefit, and with substantial drawback in terms of performance and cost. The Petition and the expert declaration simply allege that both transparent and non-transparent displays were available, but give no rationale as to why one would completely redesign Jaszlics to implement hardware that would work against its purpose of displaying real video (and its occlusion capabilities as explained above), because, as a POSITA would have expected at the time, a transparent screen provides a worse contrast and overall a worse presentation of a real video feed than an opaque screen, and thus an inferior user experience, at a higher cost associated with transparent screens. Pet., 22-23; Ex. 1002, ¶¶ 99-100. Petitioner's own Piekarski 2001 reference (Ex. 1009) cautions readers of the significant costs of transparent HMDs and their potential drawbacks. Pet., 29 n.6, 33 (citing Ex. 1009); Ex. 1009, p.2 ("The key difference with the HMDs we are using is that they are partially transparent", "A HMD is a relatively simple device, (although the most expensive)."); *Id.*, p.3 ("[t]here are many kinds of HMDs on the market, although most of them tend to be expensive (thousands of dollars) . . . Also, HMDs vary in image quality and field of view depending on the price. Some displays have very dull looking images, do not work well in sunlight, and have very low resolution . . . the larger the view then the more complex the internal optics are.").

*e. To The Extent Petitioner Recharacterizes Its
Combination, There Is Also No Motivation To Combine*

Given the mischaracterization of Piekarski in the Petition, as described above, if Petitioner attempts to recharacterize the proposed combination, the motivation to combine still fails.

The Petition argues mobility as the sole, or at least primary, motivation to combine. Pet., 31 (“The advantages that a wearable, mobile computing system could provide, including increased mobility and interaction as a result of being untethered to a stationary computing system, would have been readily apparent to a person of ordinary skill in the art reviewing Jaszlics.”). It argues that with Piekarski, “users of wearable computers are not restricted to training indoors as they might have been with VR equipment,” alluding to Jaszlics. *Id.*

But the Petition goes out of its way to argue that the user in Jaszlics is not limited to training indoors, and is in fact already fully mobile: “Jaszlics, as noted, already teaches a virtual simulation system that can be used *outdoors by a mobile user* wearing electronic display goggles” (Pet., 31); “Jaszlics itself describes a user wearing electronic display goggles or visor and further discloses that *the user can be a mobile individual*—not necessarily an individual located in a vehicle” (Pet., 27).

What then would be the benefit from Piekarski in this hypothetical, modified combination (which is not disclosed in the Petition)? There is none, although one does not even need to speculate, as the Petition provides none. The only alleged motivation to combine is mobility, which the Petition argues is already a feature of Jaszlics, and increased “interaction,” which is completely unexplained and thus insufficient. If Petitioner were to argue that the benefit comes from using WiFi, that argument fails for several reasons. First, it is not present in the Petition, which makes no mention of WiFi or wireless communication as a benefit. Second, the Petition has not established any advantage that would be relevant to the Jaszlics system and its use cases, simply stating in a conclusory fashion that benefits would be obvious (Pet., 30), which ignores the substantial drawbacks of being weighed down with the multiple pieces of error-prone, failure-prone electronic equipment on the body of a user in a war simulation environment. Third, Jaszlics already discloses wireless embodiments such as “laser tag” games (Ex. 1003, 1:65), which was known to be wireless. There is therefore both no reason to load up the user in Jaszlics with the equipment in Piekarski, and many drawbacks to doing so.

f. Lack of Motivation To Modify Jaszlics Without Piekarski

The Petition also contains some brief allegations regarding single-reference obviousness, stating that “it would have been obvious for the processor [of Jaszlics]

to have been **wearable**.” Pet., 27-28. The argument is nothing more than impermissible hindsight and the modification that the Petition casts as a simple relocation of a processor would be a complete redesign of a complex, high-performance system that uses multi-processor workstation computers, as described above.

The Petition first argues the modification would have been obvious because the user is mobile already. That does nothing to explain why the system would be completely redesigned. It argues it would have “enable[d] game play involving mobile individuals (for example individuals who are moving in the real world outside of a vehicle).” Pet., 27. But in just the sentence prior, the Petition argues that Jaszlics describes “that the user can be a mobile individual—not necessarily an individual located in a vehicle” (citing the text in the reference, “[f]or moving observers, who may be individuals moving in the real world, or housed in a vehicle. . .”). Thus the Petition argues motivation based on ability to enable something that is allegedly already enabled in the reference, and so the rationale fails.

The only other rationale in the single-reference obviousness argument is simply that some form of wearable computer systems existed at the time. Pet., 28. This argument says nothing about the capabilities of those systems, nor any motivation for making the wholesale changes to Jaszlics that the modification would require. And the only evidence is the expert’s discussion of Piekarski. This rationale

thus fails, at least for the same reasons as with the combination with Piekarski described above.

For the reasons above, the Grounds fail to disclose all elements of claim 1.

2. Grounds 2-5

As explained in Sections VI.A.2, VI.A.3, VI.A.4 and VI.A.5, Grounds 2-5 add nothing to the claim 1 analysis and thus fail for the same reasons as Ground 1 fails.

C. The Grounds Fail To Disclose “A Handheld Controller For Providing At Least One Control Signal To Said Video Game” (Claim 13)

Independent Claim 13 of the '476 Patent requires “a handheld controller for providing at least one control signal to said video game.” The Petition asserts Jaszlics’s discloses and renders obvious this limitation. Pet., 48. But the elements the Petition relies on in Jaszlics are not “handheld,” and there is no motivation to convert them into “handheld” controllers.

1. Ground 1

a. A Mouse Is Not a Handheld Controller

Petitioner first argues that the “mouse control device” described in Jaszlics is a handheld controller. Pet., 48. A mouse is not “handheld” in the sense required by the '476 Patent. That is incorrect. As is well-known, a user uses a mouse by laying it on a flat surface and moving it around that flat surface by resting his or her hand on top of it. The user does not hold the mouse in his or her hand. The '476 Patent

consistently uses “handheld” to refer to controllers that are movable in space, such as a handheld controller that can be carried and operated while in motion. Specifically, the ’476 Patent discloses that the user may “swing around a hand-held controller to register internal sensor readings as control signals to, for example, swing around a video game object (e.g., a sword or lightsaber) in a game.” Ex. 1001, 8:1-4. The ’476 Patent provides additional examples the functionalities permitted by such handheld controllers, describing that “video game object[s] controlled . . . may include, for example, a fishing rod, tennis racket, baseball bat, pool cue, football (e.g., throwing a football), baseball (e.g., throwing a [baseball]), steering wheel, clutch, gun (or another object-projecting device or projectile), horse-racing whip, frisbee, net, boxing gloves, or any type of object or action.” *Id.*, 8:7-14.

A “mouse control device,” that is used to make “selections from lists of multiple choices, displayed on a color VGA screen,” (Ex. 1003, 11:12-13), is a desktop peripheral that is not designed to be held in the hand.

b. The Joysticks and Pushbuttons of Jaszlics Are Not Handheld

Petitioner also points to the “joysticks and pushbuttons” which are briefly mentioned in Jaszlics. Pet., 48. However, Jaszlics does not disclose these devices as being handheld. Rather, they are described as manual input controls that are physically incorporated into a larger system, such as a vehicle, like a tank, in the

main embodiment, or provided on a display screen. Ex. 1003, 10:34-37 (“Observer actions that are relevant to virtual-live interactions may also include the steering of a vehicle housing the observer, or manipulation of control devices such as joysticks or pushbuttons.”). These joysticks and pushbuttons are used for things like “the observer’s use of the battle tank’s fire control system controls, or the actual firing of the gun through a trigger.” *Id.*, 10:27-29. The pushbuttons are also used to select from lists on a screen. *Id.*, 11:10-13 (“Observer controls include software implemented pushbuttons, option selection buttons, and selections from lists of multiple choices, displayed on a color VGA Screen, and activated by a mouse control device.”). There is no disclosure in Jaszlics that these devices are held in the user’s hand, nor is there any reason for them to be. Instead, they are built into the system, as one would expect in a tank:



c. There Is No Motivation to Modify Jaszlics to Include a Handheld Game Controller

Petitioner further argues that it would have been “routine and conventional at the time for joysticks and push buttons to be provided in a handheld form factor, such as the controllers provided with Atari and Nintendo game consoles in the 1970s-1990s.” Pet., 48 (citing EX1015, p.6 (entry for “joystick”). But this assertion

completely ignores the context of Jaszlics. Jaszlics is expressly directed to systems that are designed to replicate the real-world experience of operating a tank or similar vehicle, with controls that are integrated into the vehicle's architecture to ensure realism, immersion, and functional accuracy. Ex. 1003, 1:42-46 ("The army also trains armored vehicle crews in war games using actual vehicles moving over real terrain. These vehicles can be fully instrumented and connected to computer systems that record and analyze the performance of the crew and vehicle throughout the exercise."), *Id.*, 2:60-63 ("[an] object of the present invention is to provide . . . simulators for aircraft or armored vehicles."), *Id.*, 10:17-23 ("(the battle tank's gunner or commander) would observe and track the virtual opponent embedded in the real-world scene through the tank's actual gun sight, and engage it by depressing the trigger of the tank's main gun.")).

Accordingly, the system of Jaszlics is designed to train users in the precise operation of real-world equipment (*e.g.*, "movement of the vehicle and rotation of the turret" (*Id.*, 10:32)). Replacing these integrated systems with a handheld controller— "such as the controllers provided with Atari and Nintendo game consoles in the 1970s-1990s," as argued by the Petitioner—would fundamentally undermine the realism and training value of the simulation. Pet., 48-49. For at least these reasons, the proposed combination should be rejected.

d. Laser Tag Is Not A Video Game

Finally, Petitioner argues that “[t]he obviousness of using a ‘handheld’ controller is further confirmed and motivated by Jaszlics’s teaching that its system is broadly applicable to games, including those involving mobile individuals such as laser tag.” Pet., 49 (citing Ex. 1003, 1:64-67). To support this assertion, Petitioner points to the image provided below and indicates that “[i]t would have been obvious . . . for a controller in a laser tag-like embodiment to have a form factor resembling a handheld gun.” Pet., 49.



Pet., 49. But claim 13 requires “a handheld controller for providing at least one control signal to said *video game*.” The laser tag example is inapplicable here because laser tag is not a video game. Rather, laser tag is a physical activity in which wear vests equipped with sensors and players run around and fire light-based guns

at one another. There is no video aspect and no video game aspect. For example, Petitioner's image above shows a woman carrying a handheld gun and moving through her physical environment, without any aspect of a video game being present.

For the foregoing reasons, Petitioner has failed to demonstrate that Jaszlics teaches or renders obvious the limitation of "a handheld controller for providing at least one control signal to said video game" as recited in independent claim 13 of the '476 Patent. Accordingly, the Grounds fail to disclose all elements of claim 13.

2. Ground 5

As explained in Section VI.A.5, Ground 5 adds nothing to the claim 13 analysis and thus fail for the same reasons as Ground 1 fails.

VII. Conclusion

For the above-described reasons, Patent Owner respectfully requests that the Board deny institution.

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Respectfully submitted,

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CERTIFICATE OF WORD COUNT

The undersigned certifies that the portions of the above-captioned PATENT OWNER'S PRELIMINARY RESPONSE specified in 37 C.F.R. § 42.24 have 10,797 words, in compliance with the 14,000 word limit set forth in 37 C.F.R. § 42.24(b)(1). This word count was prepared by the word-processing program used to prepare this paper (Microsoft Word).

Dated: July 18, 2025

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CERTIFICATE OF SERVICE

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