

Petition for *Inter Partes* Review of
U.S. Patent No. 10,179,277 B2

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,
Petitioner

v.

MULLEN INDUSTRIES LLC,
Patent Owner.

Case IPR2025-00739
U.S. Patent No. 10,179,277 B2
Issue Date: January 15, 2019

Title: LOCATION-BASED GAMES AND
AUGMENTED REALITY SYSTEMS

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,179,277 B2**

Table of Contents

	Page
I. MANDATORY NOTICES UNDER §42.8(A)(1).....	1
A. Real Party-In-Interest under §42.8.(b)(1)	1
B. Related Matters under §42.8(b)(2)	1
C. Lead and Back-Up Counsel under §42.8(b)(3).....	1
D. Service Information	2
II. FEE PAYMENT	2
III. REQUIREMENTS UNDER §§ 42.104 AND 42.108 AND CONSIDERATIONS UNDER §§ 314(A) AND 325(D).....	3
A. Grounds for Standing.....	3
B. Identification of Challenge and Statement of Precise Relief Requested	3
C. Considerations Under §§ 314(a) and 325(d).....	3
IV. OVERVIEW OF THE PATENT	4
A. Level of Ordinary Skill	4
B. Specification Overview.....	5
V. CLAIM CONSTRUCTION	8
VI. THE CHALLENGED CLAIMS ARE UNPATENTABLE.....	8
A. Overview of Grounds.....	8
B. Prior Art Status of Relied-Upon References.....	10
C. Ground 1: Claims 1, 8, 13, and 20 Are Obvious Over Jaszlics in view of Rallison.....	10
1. Independent Claim 1: “A non-transitory computer- readable medium with stored program logic thereon, when executed by a processor, cause the processor to perform the method comprising:” (1[pre])	10

Table of Contents
(continued)

Page

(a)	“providing 3-D video game indicia to a head-mounted display of a head-mounted device with respect to a physical playfield based on video game logic associated with a video game, wherein said head-mounted device includes a processor;” (1[a]).....	13
(b)	“utilizing a detector to determine landscape characteristics of said physical playfield, wherein said video game logic utilizes said landscape characteristics in providing said video game; and” (1[b])	25
(c)	“utilizing a locating device to determine the physical location of said locating device on said physical playfield, wherein said video game logic utilizes the physical location of said locating device in providing said video game.” (1[c]).....	31
2.	Claim 8: “The non-transitory computer-readable medium of claim 1, further comprising utilizing an infrared receiver.”	34
3.	Claim 13: “The non-transitory computer-readable medium of claim 1, further comprising determining a pitch of said head-mounted display, determining a roll of said head-mounted display, and determining a height of said head-mounted display.”	36
4.	Claim 20: “The non-transitory computer-readable medium of claim 1, further comprising utilizing manual controls, wherein a pitch of said head-mounted display is determined and a roll of said head-mounted display is determined.”	40
VII.	CONCLUSION	40
	CERTIFICATE OF SERVICE.....	43

Petition for *Inter Partes* Review of
U.S. Patent No. 10,179,277 B2

List of Exhibits

Exhibit No.	Description of Document
1001	U.S. Patent No. 10,179,277 B2 to Jeffrey David Mullen (filed Apr. 27, 2016, issued Jan. 15, 2019) (“ ’277 ” or “ ’277 patent ”)
1002	Declaration of Jeremy Cooperstock, Ph.D. (“ Cooperstock ”)
1003	U.S. Patent No. 6,166,744 to Ivan J. Jaszlics and Sheila L. Jaszlics (filed Sep. 15, 1998; issued Dec. 26, 2000) (“ Jaszlics ”)
1004	U.S. Patent No. 6,369,952 B1 to Richard Dennis Rallison et al. (filed Aug. 17, 1999; issued Apr. 9, 2002) (“ Rallison ”)
1005	U.S. Patent No. 6,411,266 B1 to Francis J. Maguire, Jr. (filed Nov. 17, 1995; issued Jun. 25, 2002) (“ Maguire ”)
1006-1010	(Reserved)
1011	U.S. Provisional Patent App. No. 60/066,904 (“ Jaszlics Provisional ”)
1012	Excerpts from Microsoft Computer Dictionary (5th ed. 2002)
1013	(Reserved)
1014	Excerpts from IEEE 100 : The Authoritative Dictionary of IEEE Standard Terms (7th ed. 2000)
1015	Excerpts from Joseph Angelo, Dictionary of Space Technology (1999)
1016	’277 Patent File History
1017	(Reserved)
1018	Proof of Service of Complaint

I. MANDATORY NOTICES UNDER §42.8(A)(1)

A. Real Party-In-Interest under §42.8.(b)(1)

Meta Platforms, Inc. is the real party-in-interest to this IPR petition.

B. Related Matters under §42.8(b)(2)

The '277 patent is the subject of pending litigation involving Petitioner: *Mullen Industries LLC v. Meta Platforms, Inc.*, Case No. 1:24-cv-00354-DAE (W.D. Tex.). Petitioner was served on April 5, 2024. (EX1018, p.003.)

Petitioner is filing IPR petitions against twelve related patents asserted by Patent Owner in the pending litigation involving Petitioner:

U.S. Patent No.	IPR Case
8,585,476 B2	IPR2025-00737
9,744,448 B2	IPR2025-00738
10,179,277 B2	IPR2025-00739
10,828,559 B2	IPR2025-00740
10,967,270 B2	IPR2025-00702
11,033,821 B2	IPR2025-00703
11,376,493 B2	IPR2025-00741
11,904,243 B2	IPR2025-00742
11,947,716 B2	IPR2025-00743
12,019,791 B2	IPR2025-00744
9,662,582 B2	IPR2025-00745
10,974,151 B2	IPR2025-00746

C. Lead and Back-Up Counsel under §42.8(b)(3)

Petitioner provides the following designation of counsel.

Petition for *Inter Partes* Review of
U.S. Patent No. 10,179,277 B2

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D. Service Information

This Petition is being served by Federal Express to the attorney of record for the '277 patent, 32733 - JEFFREY D. MULLEN, 2212 Hassinger Lane, Glenshaw, PA 15116. Petitioner consents to electronic service at the addresses provided above for lead and back-up counsel.

II. FEE PAYMENT

Petitioner requests review of 4 claims, with a \$51,875 payment.

**III. REQUIREMENTS UNDER §§ 42.104 AND 42.108 AND
CONSIDERATIONS UNDER §§ 314(A) AND 325(D)**

A. Grounds for Standing

Petitioner certifies that the '277 patent is available for IPR and that Petitioner is not barred or otherwise estopped.

B. Identification of Challenge and Statement of Precise Relief Requested

Petitioner requests IPR institution based on:

Ground	Claims	Basis for Challenge under §103
1	1, 8, 13, 20	Jaszlics (EX1003) in view of Rallison (EX1004)

Submitted with this Petition is the Declaration of Jeremy Cooperstock, Ph.D. (EX1002) (“Cooperstock”), a qualified technical expert. (EX1002, ¶¶1-18, Appendix A.)

C. Considerations Under §§ 314(a) and 325(d)

§314(a): The *General Plastic* factors are not relevant as this is the first and only IPR petition filed by Petitioner with respect to the '277 patent.

Nor do the *Fintiv* factors support discretionary denial under §314(a). The pending litigation against Petitioner is in relatively early stage, with little substantive discovery having taken place to date and claim construction proceedings ongoing. Trial is scheduled to start October 5, 2026—over eighteen months from now—and a motion to transfer the case by Petitioner to the Northern District of California is

currently pending, which if granted would likely result in an even later trial date. Petitioner also intends to move to stay the litigation pending resolution of the IPRs. Additionally, to allay concerns over duplication of efforts, Petitioner represents that, in the event of institution, it will not pursue in litigation any invalidity defense that was or could have been raised in IPR.

§325(d): This Petition does not raise a § 325(d) issue because neither Jaszlics (EX1003) nor Rallison (EX1004) was cited or otherwise identified during prosecution.

IV. OVERVIEW OF THE PATENT

A. Level of Ordinary Skill

A person of ordinary skill would have possessed a bachelor's degree in electrical engineering, computer science, or similar field, with two years combined experience in designing and/or developing interactive location-based computer systems/software, such as video games or other simulations incorporating location information (such as GPS information associated with a user's physical location), and in designing and/or developing computer systems/software involving graphical virtual and/or augmented reality. A person could also have qualified as a person of ordinary skill in the art with some combination of (1) more formal education (such as a master's of science degree) and less technical experience, or (2) less formal education and more technical or professional experience. (EX1002, ¶¶21-25.)

B. Specification Overview

The '277 patent states that it provides “a location-based game system in which the physical location (or physical movement) of a user on a physical playfield” obtained by, for example, a GPS device, “determines the virtual location (or virtual movement) of a virtual character on a virtual playfield.” ('277, 7:22-28.) The system may include a head-mounted display so that “video game indicia may be overlaid onto the user’s physical playfield,” such as the user’s “physical environment.” ('277, 3:50-52; *see also id.*, 1:55-59 (listing “the physical world, a physical environment, or a defined physical playfield” as examples of a “physical playfield”).) “The physical environment can then be manipulated by a processor such that, for example, virtual indicia (e.g., a video game character or component is added) is added to the physical environment.” ('277, 3:60-63.)

The '277 patent further states that “[a] landscape detector may be provided with a location-based game system such that information on the physical terrain of the user’s physical environment may be utilized by the gaming system.” ('277, 4:18-21.) Figure 4, reproduced below, “is an illustration of landscape detection constructed in accordance with the principles of the present invention”:

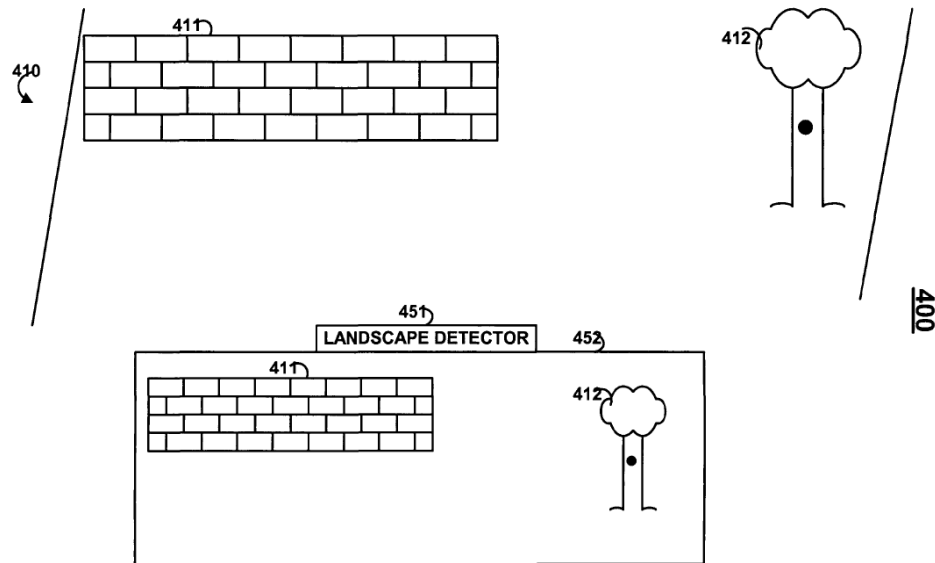


FIG. 4

(’277, Fig. 4, 6:13-14.) Referring to Figure 4, the ’277 patent states that “[l]andscape detector **451** may take multiple forms”:

For example, landscape detector **451** may measure the distance to objects and the shape of the object. This may be done for example by sound/light sensing (e.g., reflective sensing such as sound/light echoing or color sensing with respect to light source) or any type of object/distance sensing (e.g., infrared). A camera may be utilized to take a picture/video of the environment. Video processing features may be utilized to determine landscape as, for example, a user moves around the landscape.

(’277, 15:18-27.) “The information provided by the landscape detector may be utilized, for example, to position where portions of a video game playfield, objects, and characters may be positioned on a display (e.g., on a head-mounted display).”

(’277, 4:24-27.) “Such information may also be used, for example, to control the

movement characteristics of computer-controlled video game characters and indicia.” (’277, 4:27-30.) For example, Figure 6, reproduced below, “is an illustration of computer-controlled character positioning and movement based on detected landscape objects constructed in accordance with the principles of the present invention”:

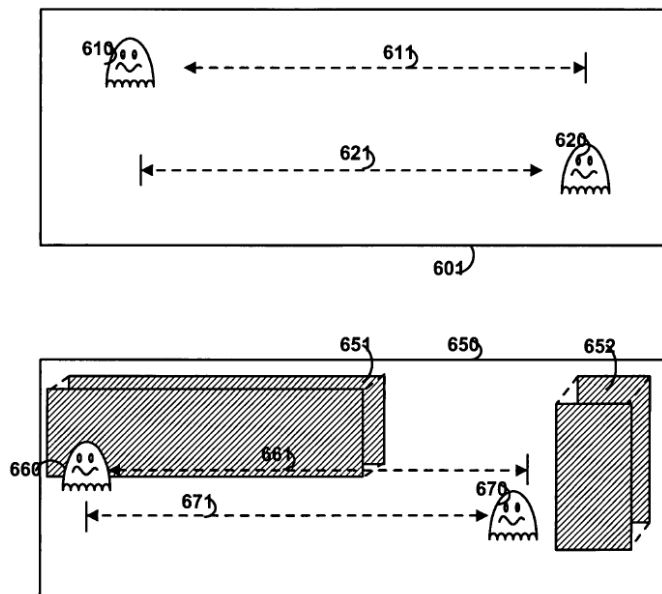


FIG. 6

(’277, Fig. 6, 6:20-23.) Referring to Figure 6, the ’277 patent states that “[i]n environment **650**, actual environmental object may be present and stored in memory as virtual objects **651** and **652**.” (’277, 18:14-16.) “If the stored location of virtual objects **651** impedes on the planned movement of virtual characters, then program logic (e.g., game code) may manipulate the movement path of virtual characters around these virtual objects.” (’277, 18:21-25.)

V. CLAIM CONSTRUCTION

Petitioner does not believe express claim construction is necessary at this time. The prior art cited herein, as demonstrated below, renders the challenged claims obvious under any reasonable construction. Petitioner therefore respectfully submits that, for purposes of this IPR, express constructions are not required.

VI. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Overview of Grounds

The challenged claims attempt to lay claim to techniques for location-based video games in which a user sees their real-world surroundings combined with virtual objects . But these techniques were well-known before the '277 patent.

The sole ground in this Petition relies on Jaszlics (**EX1003**), which as its title demonstrates, describes a “system for combining virtual images with real-world scenes.” The augmented reality gaming and simulation system it describes is remarkably similar to the '277 patent. (Cooperstock, ¶52.) Jaszlics is a strong reference that discloses the majority of the claim limitations. Focusing on war gaming applications, but also making clear that the system is broadly applicable to outdoor location-based augmented reality gaming, Jaszlics provides a “combined reality” experience for a user by combining real-time, real-world imagery of a user’s physical surroundings with images of virtual entities, such as tanks. (*Id.* (citing Jaszlics, 1:64-67, 2:60-63).) For example, Jaszlics describes how, using data

collected with a range scanning device (such as a modified infrared surveyor's ranging laser), the distance and shape of real-world physical features around the user are detected and used to more realistically overlay virtual entities in the real-world scene. (*Id.* (citing Jaszlics, Fig. 1, 4:12-23).) The combined imagery—for example, as shown by Figure 1d below—can then be presented via head-mounted display to the user.

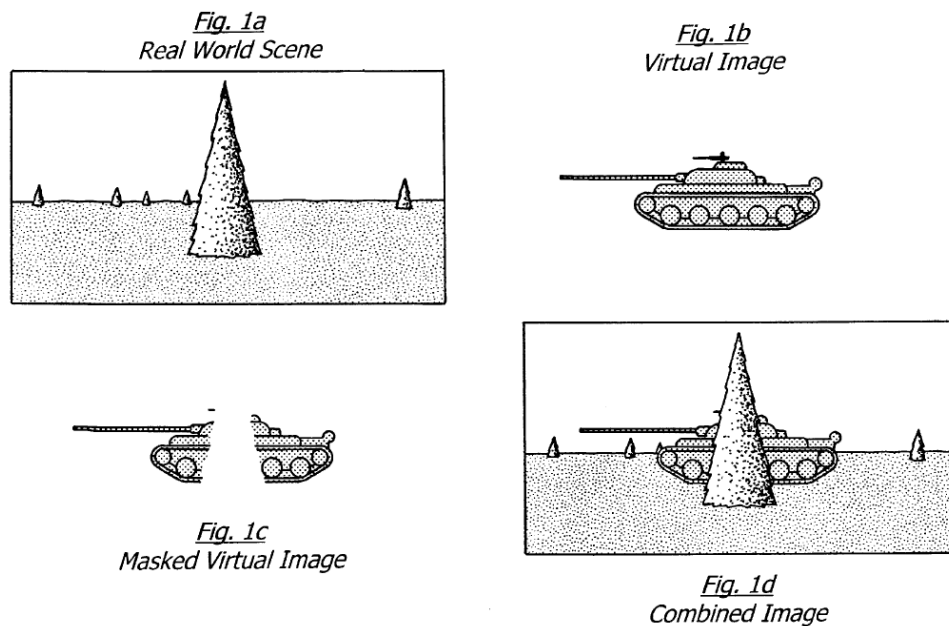


Fig. 1

(*Id.* (citing Jaszlics, 9:36, 9:48-57, 2:10-13).)

The Petition also cites Rallison (**EX1004**) in connection with two minor points that are arguably disclosed by or at least obvious over Jaszlics alone—**(1)** a head-mounted device that “includes a processor” and **(2)** determining “pitch” and “roll” of a head-mounted display. (Cooperstock, ¶¶56-57.)

B. Prior Art Status of Relied-Upon References

Pre-AIA law applies to the challenged claims, and each reference cited in the grounds listed in **Part III.B** qualifies as prior art to the '277 patent. Jaszlics and Rallison qualify as prior art under § 102(b) because they issued more than one year before the priority date.¹

C. Ground 1: Claims 1, 8, 13, and 20 Are Obvious Over Jaszlics in view of Rallison

1. Independent Claim 1: “A non-transitory computer-readable medium with stored program logic thereon, when executed by a processor, cause the processor to perform the method comprising:” (1[pre])

Assuming the preamble provides a claim limitation, it is disclosed by and obvious over Jaszlics. (Cooperstock, ¶¶59-63.)

As explained in more detail for the limitations that follow, Jaszlics discloses a “combined reality” computer system in which virtual images, such as images of a

¹ The '277 patent claims priority to a provisional application (no. 60/628,475) filed November 16, 2004. For purposes of this Petition, Petitioner has assumed a priority date of November 16, 2004. Petitioner at this time expresses no opinion on whether the '277 patent is actually entitled to the benefit of the provisional application filing date. This issue is not relevant here because both prior art references relied upon are § 102(b) statutory-bar references with respect to the '277 patent.

virtual tank or other animated virtual entities, are combined with real-world scenes and displayed together to a user. (Jaszlics, 2:40-56 (“This invention provides a system for combining virtual images with images of the real world.... The resulting combined image is presented in an electronic or optical display.”), 1:13-15, 3:13-16, Table 7 (col. 21) (defining “combined reality” as “Apparent reality, with virtual elements projected into the image of the real world. Virtual and live elements may interact through simulation.”); Cooperstock, ¶60.)

Turning to the language of the preamble, Jaszlics discloses, and a person of ordinary skill in the art would have understood and found it obvious, that its computer system comprises “**a non-transitory computer-readable medium with stored program logic thereon.**” (Cooperstock, ¶61.) Jaszlics describes its system as using a conventional computing system, such as “a personal workstation running two 266 MHz Pentium II processors,” to execute software including “virtual simulation and control software” for providing a virtual simulation (or “scenario”). (Jaszlics, 14:13-18, 14:66-15:1; *see also id.*, 15:53-56 (“The virtual entities implemented by the virtual simulation and control software are capable of engaging the avatar of the observer’s vehicle, depending on the scenario loaded in.”), 17:11-12 (describing “scenario” “executed by the virtual simulation and control software”).)

Because memory and software are basic components of a conventional computing system, a person of ordinary skill in the art would have understood and found it obvious that Jaszlics' system would have included a **“a non-transitory computer-readable medium”** (such as a hard drive and/or RAM) having **“stored program logic thereon,”** including the logic associated with the system's “virtual simulation and control software” and virtual simulations executed by the software, such as various “scenarios” providing war game simulations. (Cooperstock, ¶62 (citing EX1012, pp.007-008 (entry for “microprocessor”))).²

For the same reasons, Jaszlics discloses, and a person of ordinary skill in the art would have understood and found it obvious, that its computer system comprises **“a processor”** (such as a “Pentium II processor[]” (Jaszlics, 14:13-18)) to execute

² In addition, Jaszlics' provisional application includes exemplary source code excerpts for military war game simulation software that repeatedly refers to “memory,” thus further confirming the understanding of a person of ordinary skill in the art that Jaszlics' system would comprise **“a non-transitory computer-readable medium with stored program logic thereon.”** (Cooperstock, ¶62 n.4 (citing EX1011 (Jaszlics Provisional), 0048, 0052, 0090); *see generally* EX1011, 0047-00142.)

the “stored program logic” and “**cause the processor to perform**” the operations for providing a combined reality simulation. (Cooperstock, ¶63.)

- (a) **“providing 3-D video game indicia to a head-mounted display of a head-mounted device with respect to a physical playfield based on video game logic associated with a video game, wherein said head-mounted device includes a processor;” (1[a])**

Starting first with “**a head-mounted display of a head-mounted device,**” Jaszlics’ combined reality system includes “**a head-mounted display of a head-mounted device,**” such as “electronic display goggles,” “virtual reality goggles or visors worn by the observer [i.e., the user of the system³].” (Jaszlics, 9:48-57; *see also id.*, 2:10-13 (“The present invention can be used with electronic display goggles to greatly extend this entertainment medium by injecting, in real time, three-dimensional virtual elements into the view of the real world.”), 9:34-39 (“The display **111** may be any display system capable of displaying the combined image, such as...an electronic goggle or visor...”), 10:52-57 (“The position and orientation of the observer (including the movement and attitude of the vehicle, if any, housing the observer) is sensed by observer sensors and controls **115** such as a magnetic or

³ Jaszlics describes a player/user of its system as an “observer.” (*See* Jaszlics, 10:11-17 (“The observer **113** of the display is assumed to be the user of the invention for various purposes, such as military training, or entertainment...”).)

infrared head tracker system used in conjunction with virtual reality goggles.”).⁴
Jaszlics therefore discloses “**a head-mounted display of a head-mounted device,**”
as claimed, such as the display included as part of a head-worn visor/goggle device.
(Cooperstock, ¶64.)

Jaszlics also teaches that its computer system “**provid[es] 3-D video game indicia**” “**with respect to a physical playfield**” to the head-mounted display.
(Cooperstock, ¶65.) Petitioner notes that the ’277 patent describes “**physical playfield**” as broadly including “the physical world, a physical environment, or a defined physical playfield[.]” (’277, 1:55-59.)

Jaszlics teaches that the “electronic display goggles” or “visors” (“**head-mounted display of a head-mounted device**”) are used to display, for example, virtual tanks and other virtual objects (“**3-D video game indicia**”) overlaid within a physical landscape surrounding the user (“**physical playfield**”). Figure 1 of Jaszlics illustrates, with Fig. 1d in particular showing how a virtual tank (exemplary “**3-D video game indicia**”) is displayed within a real world scene (“**display[ed]...with respect to a physical playfield**”):

⁴ All underlining added to quoted material unless noted.

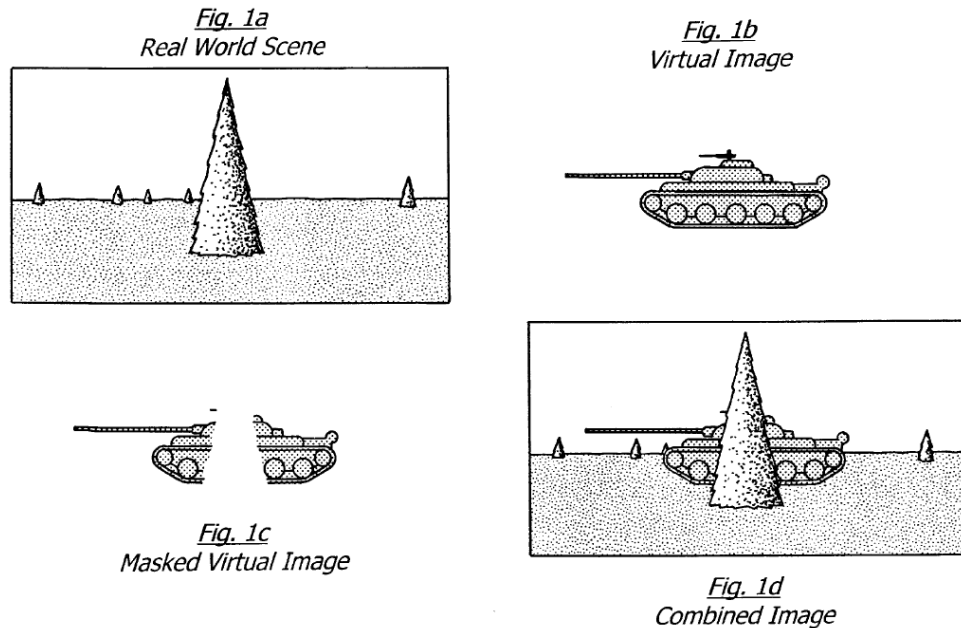


Fig. 1

(Jaszlics, Fig. 1; *see also id.*, 4:19-23 (“The masked virtual image and the image of the real world are then combined in such a manner that in the resulting combined image (FIG. 1d) the virtual object will appear to exist and move in the real world at its virtual position.”), 8:53-56 (“In 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**.”), 23:56-59 (claim 4, reciting “wherein said display means comprises an electronically-controlled visor and wherein the field of view comprises the field of view visible through said visor”), 25:3-6 (claim 15, reciting “wherein said combined image is displayed through an electronically-controlled visor and wherein the field of view comprises the field of view visible through said visor”); Cooperstock, ¶66.)

As another example, Figure 14 of Jaszlics, below, illustrates virtual tanks **162** (“**3-D video game indicia**”) overlaid on hills **160** of the user’s physical environment (“**physical playfield**”):

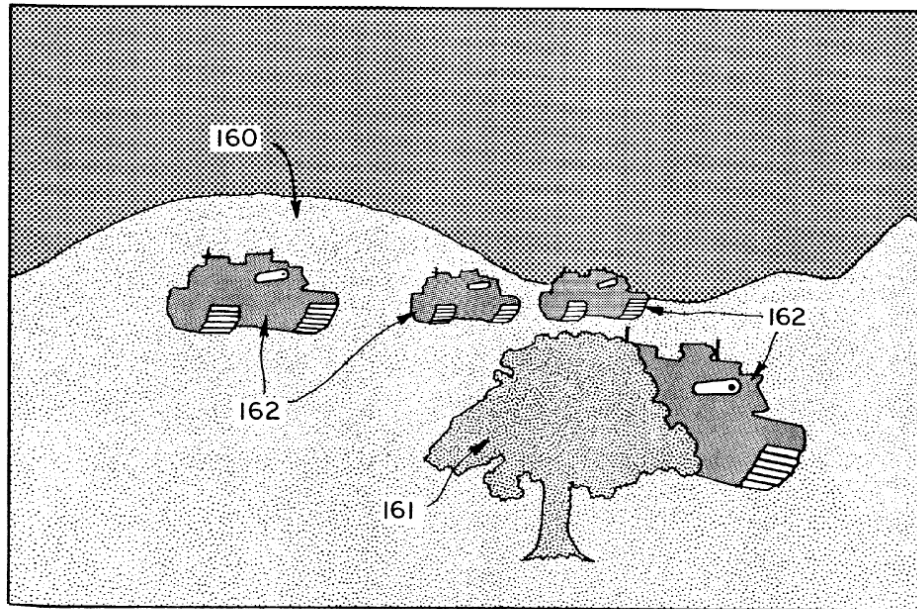


Fig. 14

(Jaszlics, Fig. 14; *see also id.*, 3:49-51, 9:60-62 (describing Fig. 14); EX1011 (Jaszlics Provisional), 00152, Fig. 14 (identifying **160** as “Hills” and **162** as “Virtual Entities”); Cooperstock, ¶67.)

As a third illustration, referring to Figure 15 (below), Jaszlics explains how the overlaid “**3-D video game indicia**” can be a variety of virtual elements, such as a path marker **172**, a unit boundary **173**, a navigational marker **174**, and a phase line **175**, which are overlaid on terrain **170**:

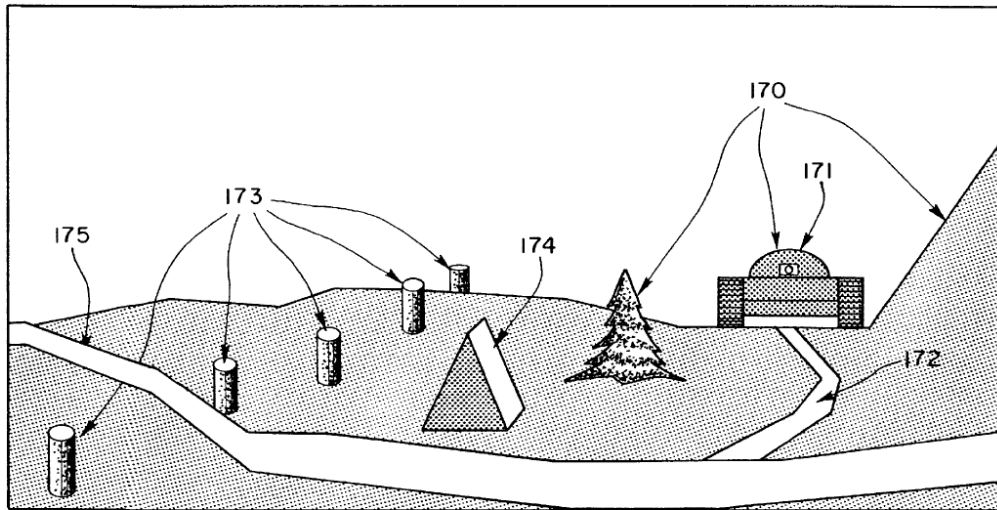


Fig. 15

(Jaszlics, Fig. 15; *see also id.*, 9:64-10:9 (“The virtual entities generated by a virtual entity simulation do not necessarily represent a real-world object. For example, they may represent fictional characters or entities, or views of conceptual objects. An example of conceptual virtual entities is shown in FIG. 15. In FIG. 15, the real-world objects 170 include the terrain, a tree, and a battle tank, in which the observer or observers 171 of a combined reality view presented to them are located. The conceptual virtual entities in the figure are conceptual objects: a path marker 172, a unit boundary 173, a navigational marker 174, and a phase line 175. The present system positions the conceptual virtual entities in the display in such a manner that they appear to be present in the landscape visible to the observer(s).”); Cooperstock, ¶68.)

Turning more specifically to the phrase “3-D video game indicia,” Jaszlics teaches that the virtual entities, such as virtual tanks and other characters, entities or

conceptual objects, are both “**3-D**” and “**video game**” indicia. (Cooperstock, ¶69.) With respect to “**3-D**,” the figures from Jaszlics shown above include 3-D virtual elements, most clearly shown by unit boundary **173** and navigational marker **174** in Figure 15. More generally, Jaszlics explains that the virtual entities can be generated and rendered using the “Virtual Reality Modeling Language” (“VRML”) or “any rendering system capable of rendering three-dimensional objects, or two-dimensional projections of three-dimensional objects.” (Jaszlics, e.g., 8:7-16, 6:34-41.) VRML was a standard language for modeling three-dimensional interactive objects. (Cooperstock, ¶69 (citing EX1012, p.009 (entry for “VRML”)).) Jaszlics therefore discloses and renders obvious “**3-D**” indicia. (Cooperstock, ¶69.)

With respect to “**3-D video game indicia**,” Jaszlics makes clear that its combined reality system is for “video games.” (Cooperstock, ¶70.) For starters, Jaszlics specifically describes using its system for virtual war games, and related game play, such as engaging in a virtual tank battle. (Jaszlics, e.g., 10:15-25, 11:4-6, 15:15-30.) This is just like the ’277 patent, which similarly states that “an AR game system may be utilized in the military training of soldiers” and specifically recognizes this sort of military simulation as “game play.” (’277, 5:23-24; *see also id.*, 5:24-27 (“To accommodate such an application the landscape of a pre-determined area (e.g., a particular square area of a military based [sic]) may be scanned at a point before a game is played.”), 15:40-42 (“For example, if the military

desires an AR system for special operations warfare then a particular field may be utilized for game play.”.)

More specifically, Jaszlics explains that “[t]he present invention can be used in these war games to generate virtual tanks that appear to move about the terrain. This can completely eliminate the need, for example, for live tanks representing the enemy force in a war gaming exercise. Virtual vehicles and real vehicles can appear in the same scene.” (Jaszlics, 1:53-58.) Jaszlics describes military simulation game play that includes a player/user (which Jaszlics refers to as an “observer”) engaging a virtual combat vehicle and taking damage or getting “killed.” (Jaszlics, 10:15-25 (“An example of such direct interaction is the engagement of a virtual opponent from a combat vehicle, such as a battle tank.”), 11:59-63 (“For example, if one of the virtual tanks represented in this simulation engage the avatar of the observer’s tank, the resulting damage information will activate damage displays, or a ‘killed’ indicator in the observer’s sensors and controls suite.”); *see also id.*, 11:4-6 (“virtual battle damage”), 15:53-56 (“The virtual entities implemented by the virtual simulation and control software are capable of engaging the avatar of the observer’s vehicle, depending on the scenario loaded in.”), 15:25-30 (“engaging the virtual T-80s operated by the virtual simulation”), 10:39-44 (engaging virtual tank).) Jaszlics’ disclosure of using its combined reality system for simulated war games therefore discloses “**3-D video game indicia**.” (Cooperstock, ¶71.)

Putting aside its military-specific gaming applications, Jaszlics expressly teaches that its system can be used as “an interactive, recreational device,” and is broadly applicable to gaming generally, explaining that, for example, “[a]nother possible field of use is in games, such as laser tag, so that virtual players, objects, and special effects can be combined with real players and real objects in the playing field.” (Jaszlics, 1:64-67, 18:48-55; *see also id.*, 15:21-25 (“Other scenarios not related to tanks, or military training, can be selected by a user...”).) Jaszlics therefore clearly discloses and renders obvious **“3-D video game indicia.”** (Cooperstock, ¶72.)

Jaszlics also discloses, and a person of ordinary skill in the art would have understood and found it obvious, that Jaszlics’ virtual entities (**“3-D video game indicia”**) would be provided to the head-mounted display with respect to a physical playfield **“based on video game logic associated with a video game.”** (Cooperstock, ¶73.) As explained above in the discussion of the preamble, that **“video game logic”** would include the logic associated with the system’s “virtual simulation and control software” and virtual simulations executed by the software, such as various “scenarios” providing war game simulations. (Jaszlics, 14:13-18, 14:66-15:1, 15:53-56, 17:11-14.)

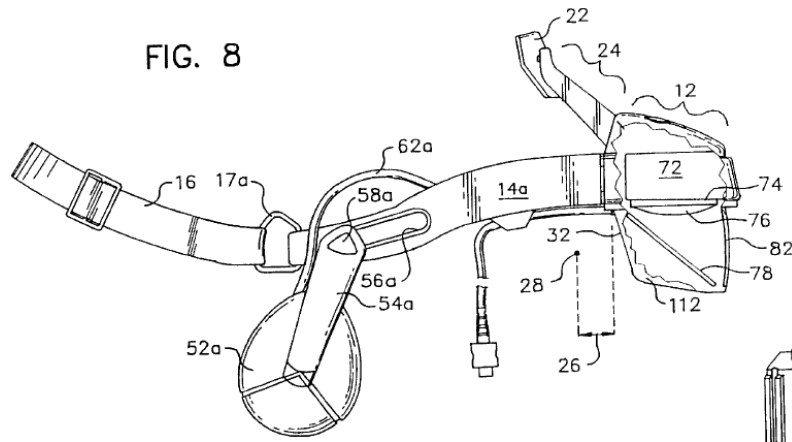
Lastly, with respect to **“said head-mounted device includes a processor,”** this would have been obvious. (Cooperstock, ¶74.) For starters, such a processor

would have been obvious over Jaszlics alone in at least two different ways. In the first way, Petitioner notes that the claim does not require any particular type of processor or that the processor perform any particular function. A person of ordinary skill in the art would have understood and found it obvious that the electronic goggles/visor described in Jaszlics would include some form of “**processor**,” such as an integrated display controller or image signal processing circuitry to provide images to the head-mounted display. (Cooperstock, ¶74 (citing EX1014, p.003 (entry for “display controller”))).)

In the second way, Petitioner further notes that it is unclear whether the claim requires that the processor be physically integrated within the head-mounted device such that the processor itself is head-mounted. For example, it is possible that a device worn in part on the user’s head and in part on the user’s back could be considered a “head-mounted device.” In that case, it would have been obvious for Jaszlics’ system to include a wearable processor and thus disclose the claimed “**head-mounted device [that] includes a processor.**” This is because 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. (Jaszlics, e.g., 10:63-67 (“For moving observers, who may be individuals moving in the real world, or housed in a vehicle...”), 5:13-18 (“dynamic scenes with a moving observation point and mobile elements within the real-world scene”),

11:16-18 (“State vectors (three dimensional position, angles, velocity, and angular velocities) are generated for the observer, and for the observer’s vehicle (if any).”), 1:64-67 (describing laser tag).) Without the ability to wear a computing system, a user’s freedom of movement in the physical environment would have been limited, undermining the user experience and Jaszlics’ goal of providing a realistic simulation. It thus would have been obvious to a person of ordinary skill in the art to have included a wearable processor to enable game play involving mobile individuals (for example, individuals who are moving in the real world outside of a vehicle). (Cooperstock, ¶75.)

Moreover, a “**head-mounted device [that] includes a processor**” as claimed would have been obvious in view of Rallison. (Cooperstock, ¶¶76-80.) Rallison, entitled “Head-Mounted Personal Visual Display Apparatus with Image Generator and Holder,” expressly describes a head-mounted display that includes “image processor circuitry.” Referring to Figure 8 (shown below), Rallison explains that “image processor circuitry” is contained within “main section **12**” of the head-mounted device:



In one embodiment, the electronics used in generating the image 72 are substantially all contained in the upper portion of the main section 12 of the apparatus as depicted in FIG. 8. The electronics used for this purpose can be those generally well-known in the art for producing video images, such as the electronics used in producing video images in the eyepiece of a video recorder and can include, for example, power supply, timing circuitry (e.g. to assure that the data which arrives is routed to the proper position of the image generators), buffer memory or other memory devices, and/or image processor circuitry.

(Rallison, Fig. 8, 10:4-14.)

Rationale and Motivation to Combine (Jaszlics and Rallison). It would have been obvious to a person of ordinary skill in the art to combine Rallison's teachings regarding a head-mounted device that includes a processor with Jaszlics. (Cooperstock, ¶77.) The combination would have involved the straightforward incorporation of a processor into the electronic goggles/visor disclosed in Jaszlics and would have predictably resulted in a head-mounted device in Jaszlics' system

that included a processor. (*Id.*) The combination therefore discloses and renders obvious a “**head-mounted device [that] includes a processor**” as claimed. (*Id.*)

Jaszlics and Rallison are both analogous references to the ’277 patent, in the same field and reasonably pertinent to problems facing the ’277 patent inventor. (Cooperstock, ¶78 (citing ’277, 1:18, 1:63-64; Jaszlics, 1:13-15, 10:63-67; Rallison, 24:7-11).)

A person of ordinary skill in the art would have been motivated to make the combination. (Cooperstock, ¶79.) As discussed, a person of ordinary skill in the art would have understood and found it obvious for Jaszlics’ electronic goggles/visor to include a processor. Rallison provides confirmation, explaining that “[t]he electronics used in generating the image” in the HMD “can be those generally well-known in the art for producing video images” and can include “image processor circuitry.” (Rallison, 10:4-14.) The combination would have therefore involved, at most, the use of a known technique to include a processor in an HMD so as to improve a similar device (Jaszlics’ HMD) in the same way. (Cooperstock, ¶79.) Moreover, because the details of a head-mounted device are not a focus of Jaszlics, a person of ordinary skill in the art, seeking to implement and adapt Jaszlics, would have naturally turned to Rallison for its additional disclosures when considering a suitable head-mounted display for Jaszlics’ system. (*Id.*)

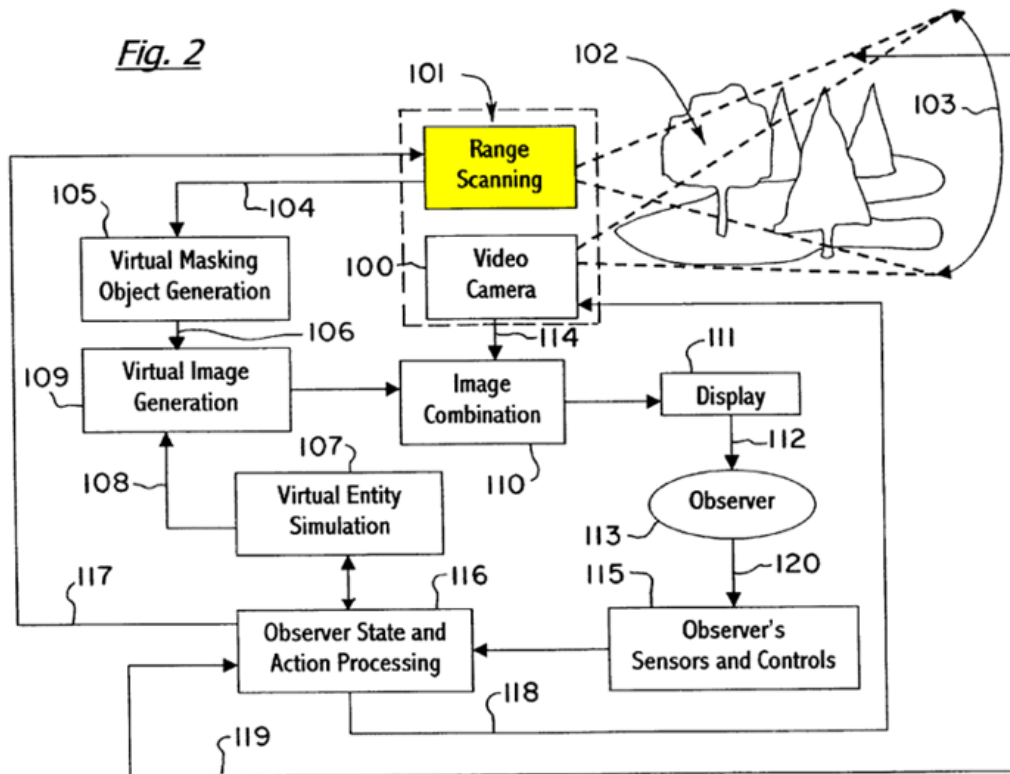
A person of ordinary skill in the art would have had a reasonable expectation

that the combination of Jaszlics and Rallison would have been successful. (Cooperstock, ¶80.) For example, Rallison treats the incorporation of a “processor” into a head-mounted device as an afterthought, explaining “[t]he electronics used for this purpose can be those generally well-known in the art for producing video images.” (*Id.* (quoting Rallison, 10:4-14).)

(b) **“utilizing a detector to determine landscape characteristics of said physical playfield, wherein said video game logic utilizes said landscape characteristics in providing said video game; and” (1[b])**

Jaszlics discloses **“a detector to determine landscape characteristics of said physical playfield”** in the form of a range scanner, such as a laser range scanner or other technology for scanning a real-world outdoor scene to determine characteristics of the scene, such as “the shape and distance of real-world objects within a field of regard of interest to the observer using the apparatus.” (Jaszlics, 2:41-46; *see also id.*, 12:19-13:44 (detailing laser scanner functionality, including transmitter and receiver sections for emitting and detecting, respectively, laser pulses); Cooperstock, ¶¶81-82.)

For example, Figure 2 of Jaszlics depicts a Range Scanning component **101** within Jaszlics’ system:



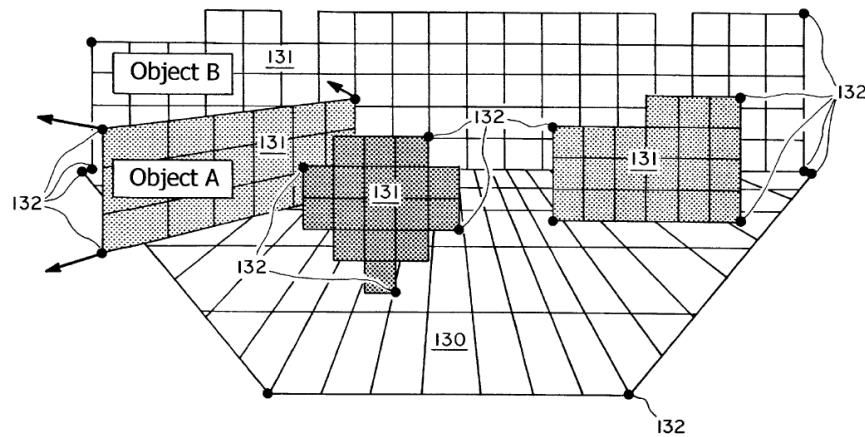
(Jaszlics, Fig. 2 (highlighting added); *see also id.*, 4:35-37 (“[A] range scanner **101** determines the distance of the entities present in a real-world scene **102** within small ranging sectors.”).) Jaszlics explains that “[r]ange scanning may be performed by a laser range scanner (as in the reference apparatus shown in FIGS. 16-22) or by other means that can determine the distance of objects within the angular space of ranging sector.” (Jaszlics, 4:43-46; *see also id.*, Figs. 16 (illustrating Laser Scanner **203**), 17 (illustrating transmitter section of laser scanner), 18 (illustrating receiver section of laser scanner), 4:60-5:6 (describing other methods for landscape detection).) The range scanner can be “a modification of a commercially available solid-state infrared surveyor’s ranging laser.” (Jaszlics, 12:19-20; *see also id.*, 12:34-36 (“The scanner

elements are built from commercially available components[.]”).)

The written description of the ’277 patent provides further confirmation that Jaszlics’ range scanner is “**a detector to determine landscape characteristics of said physical playfield**” as claimed. (Cooperstock, ¶83.) Jaszlics’ description of a range scanner that determines “the shape and distance of real-world objects” (Jaszlics, 2:41-46) in the user’s physical environment is remarkably similar to the ’277 patent’s own description of a “landscape detector” that “may measure the distance to objects and the shape of the object.” (’277, 15:18-27.)

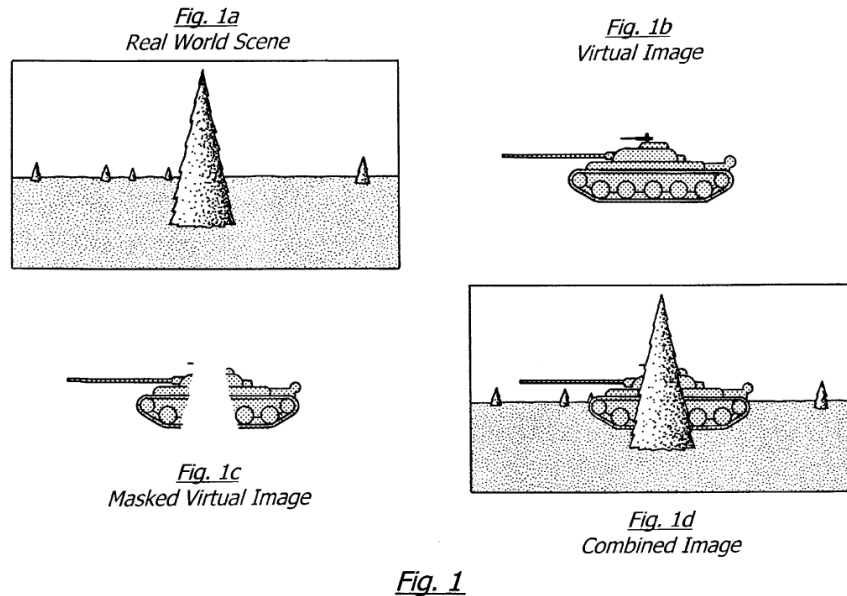
Jaszlics also discloses “**said video game logic utilizes said landscape characteristics in providing said video game.**” (Cooperstock, ¶84.) Jaszlics’ system uses the distance and shape information provided by range scanning data (“**said landscape characteristics**”) to generate “virtual masking objects” that it uses to present a more realistic virtual simulation. (Jaszlics, 2:41-46 (“Virtual masking objects, which are simplified computer models of real-world objects, are derived from the range data.”), 4:50-55 (“Range scanning is an existing technology that provides range data necessary for virtual masking object generation.”).) Figure 9 of Jaszlics, below, illustrates how the range scanning data is used to generate virtual masking objects:

Fig. 9



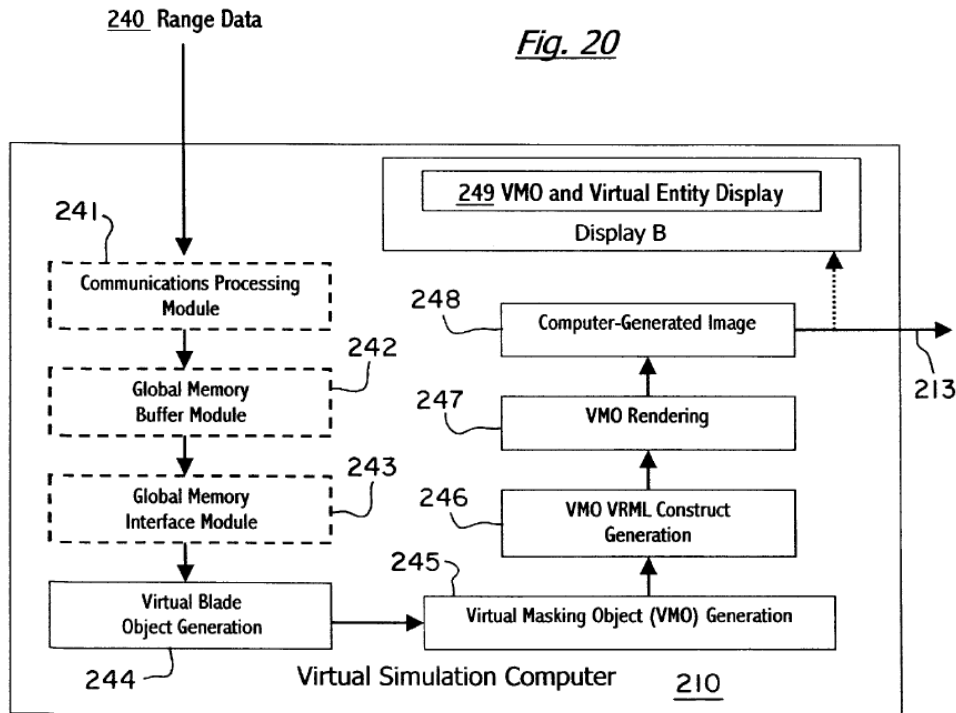
(Jaszlics, Fig. 9.) Referring to Figure 9, Jaszlics explains that it “shows several virtual masking objects, including the apparent terrain 130 observed by range scanning, and other virtual masking objects 131, which include Object A located near to the observation point, and Object B located at the extreme range of range scanning.” (Jaszlics, 7:29-34.) Jaszlics uses these virtual masking objects to present a more realistic virtual simulation, by for example, using them to generate a combined reality image where a portion of a virtual object, such as a tank, is masked out such that it appears to be partially concealed behind a real-world object, such as a tree. Figure 1 of Jaszlics illustrates:

Petition for *Inter Partes* Review of
U.S. Patent No. 10,179,277 B2



(Jaszlics, Fig. 1; *see also id.*, 4:13-27 (describing Figs. 1a-1d).)

Figure 20 of Jaszlics further illustrates how the detected ranging data—Range Data **240**—is input into and processed by Virtual Simulation Computer **210**, which implements “[v]irtual entity simulation” “through the virtual simulation and control software” (“**said video game logic**”):



(Jaszlics, Fig. 20; *see also id.*, 3:64-65 (“FIG. 20 is a simplified block diagram of the virtual masking object (VMO) generation software.”), 14:32-52 (describing input and processing of ranging data), 14:66-15:1 (“Virtual entity simulation is implemented in the virtual simulation computer through the virtual simulation and control software.”); Cooperstock, ¶85.)

Jaszlics therefore teaches that ranging data corresponding to the distances and shapes of real-world objects in the user’s physical environment (“**landscape characteristics of said physical playfield**”) is utilized by Jaszlics’ virtual simulation and control software (“**said video game logic**”) in providing a virtual simulation, such as military or non-military games (“**in providing said video game**”). (Cooperstock, ¶86.)

- (c) **“utilizing a locating device to determine the physical location of said locating device on said physical playfield, wherein said video game logic utilizes the physical location of said locating device in providing said video game.” (1[c])**

With respect to **“a locating device to determine the physical location of said locating device on said physical playfield”** the '277 patent identifies a GPS device as an example of a locating device. ('277, 4:21 (“If the locating device is a GPS device....”), 20:64-66 (“location devices (e.g., GPS, LPS, accelerometers, gyroscopes, inertial movement sensors, hybrid location systems) **1445**”); Cooperstock, ¶87.)

Jaszlics likewise discloses GPS. Jaszlics discloses using “observer sensors” for sensing a user’s position, and that the observer sensors can include “a position determination system, such as a differential Global Positioning Satellite System (GPS).” (Jaszlics, 10:52-11:4; *see also id.*, 16:30-32 (“Global Positioning Satellite (GPS) receiver”).) Jaszlics therefore discloses the claimed **“locating device”** in the form of a device comprising a GPS receiver associated with the user and used to determine the receiver’s (and thereby, the user’s) physical location. (Cooperstock, ¶88.)

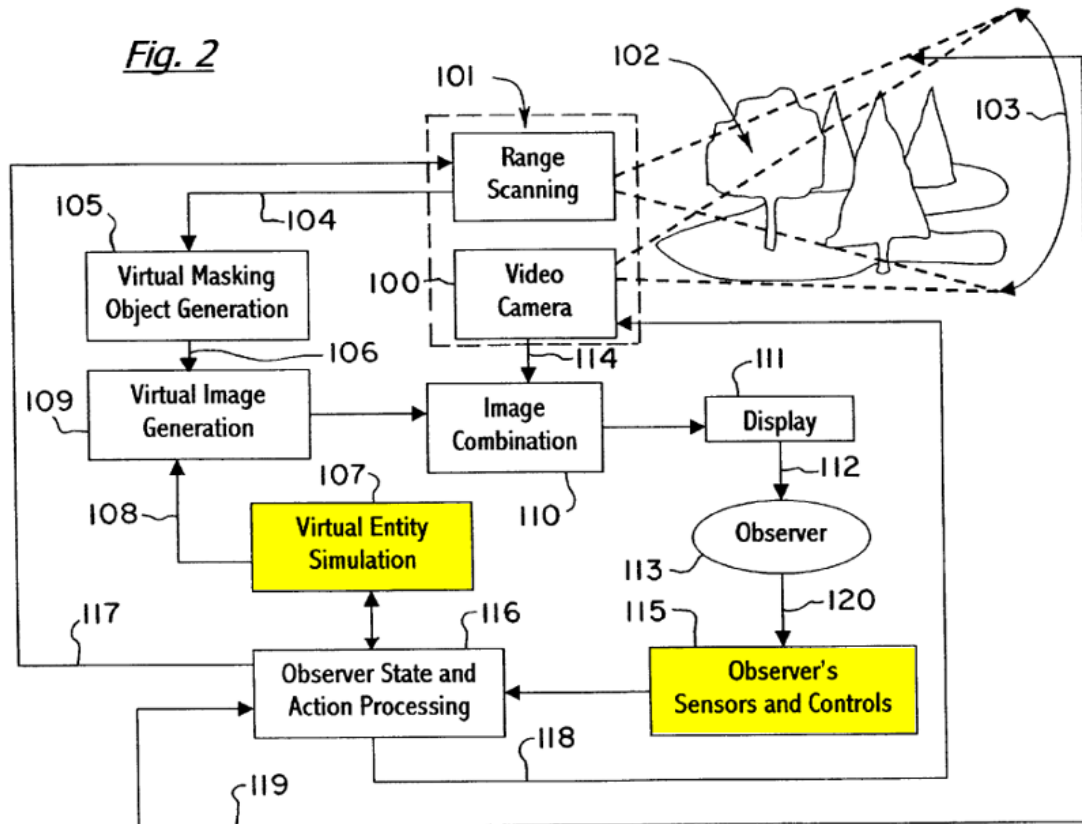
Jaszlics also teaches **“said video game logic utilizes the physical location of said locating device in providing said video game.”** (Cooperstock, ¶89.) Jaszlics explains that the system utilizes user sensor information that it receives, such as

position information, to update the simulation (“**said video game**”) accordingly, for example:

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. The virtual entity simulation receives this information for updating the simulation, in which the avatar of the observer, or the avatar of the observer’s vehicle is represented. Both the virtual entity simulation and the virtual masking object generation function will respond to the position and attitude changes of the observer, or the observer’s vehicle. Such changes will affect the angular orientation of the virtual entities and virtual masking objects, and the apparent distance from observer to virtual entities and masking objects.

(Jaszlics, 11:30-43; *see also id.*, 11:14-21 (“Observer actions sensed by the observer’s sensor and controls are transformed into data or control signals appropriate for responding to the observer’s actions.”).)

Figure 2 of Jaszlics, below, illustrates how information from observer sensors **115** (such as a GPS receiver) is input into a virtual entity simulation **107** provided by the virtual simulation and control software (“**said video game logic**”), which ultimately results in the combined reality image provided to the user:



(Jaszlics, Fig. 2 (highlighting added); *see also id.*, 14:66-15:1 (“Virtual entity simulation is implemented in the virtual simulation computer through the virtual simulation and control software.”); Cooperstock, ¶89.)

Jaszlics therefore teaches that system software including virtual simulation and control software (“**said video game logic**”) uses physical location information provided by a GPS receiver (“**utilizes the physical location of said locating device**”) to provide updated virtual simulation game play based on that information (“**in providing said video game**”). (Cooperstock, ¶90.)

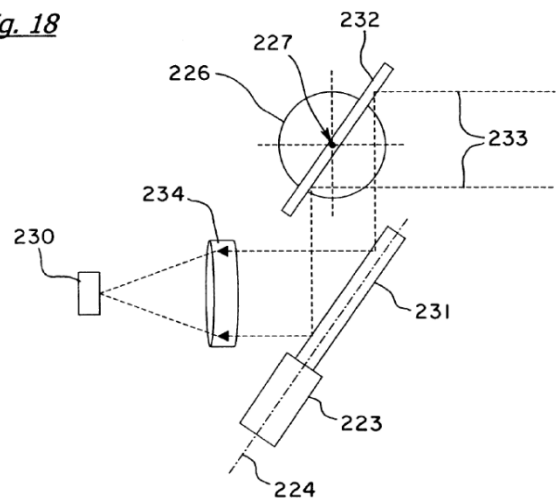
2. Claim 8: “The non-transitory computer-readable medium of claim 1, further comprising utilizing an infrared receiver.”

Jaszlics further discloses “**utilizing an infrared receiver.**” In particular, as noted, Jaszlics discloses using an infrared laser range scanner. (Jaszlics, 4:50-59 (“infrared laser scanner”), 5:31 (“infrared scanning laser”), 12:19-36 (“The laser scanner 203 is a modification of a commercially available solid-state infrared surveyor’s ranging laser...”). Jaszlics discloses that the laser range scanner utilizes a “**receiver,**” which a person of ordinary skill in the art would have understood to be an “**infrared receiver**” because it detects the reflected infrared signal. (Cooperstock, ¶91.) Referring to Figure 18 (reproduced below), a schematic of the laser scanner’s “receiver section,” Jaszlics explains:

The receiver section of the laser *Fig. 18*

apparatus, shown in FIG. 18, is closely integrated with the transmitter section. The incoming laser reflection **233** is reflected through the vertical scan mirror **232**, and the horizontal scan mirror **231**, into the sensor cell **230** of the laser

electronics unit....The lens system 234 and the sensor cell of the receiver section are standard elements of the commercial laser range finder used in the laser range scanner. The distance of the object causing the laser reflection is measured by the electronics section from the time difference between firing the outgoing laser beam **228** (in FIG. 17), and



the laser reflection.

(Jaszlics, 13:22-44, Fig. 8.)

Jaszlics also discloses “**utilizing an infrared receiver**” in a second way. Jaszlics explains that its simulation system can use a video camera that is sensitive to the infrared range of light. (Jaszlics, e.g., 8:57-61 (“The video camera may operate in the ultraviolet or infrared range...when the user of the system wishes to obtain a real-world image in a non-visible spectral region.”).) Such a video camera would therefore utilize an infrared receiver to detect the infrared light. (Cooperstock, ¶92.) Figure 14 of Jaszlics (reproduced below), depicts a combined reality display using infrared:

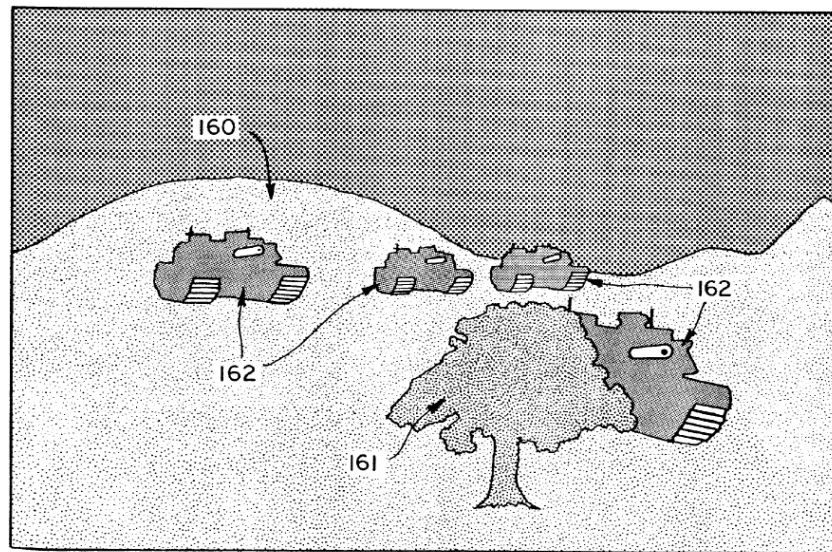


Fig. 14

(Jaszlics, Fig. 14; *see also id.*, 3:48-50 (“FIG. 14 is an example of a combined view of virtual tanks and the real world in the infrared as seen through the thermal viewer

of a tank or infantry fighting vehicle.”), 9:58-62 (“FIG. 14 shows a combined view in the infrared....”).)

3. Claim 13: “The non-transitory computer-readable medium of claim 1, further comprising determining a pitch of said head-mounted display, determining a roll of said head-mounted display, and determining a height of said head-mounted display.”

With respect to determining “pitch” and “roll,” Jaszlics discloses using sensors to detect “three-dimensional position and attitude” and “used in conjunction with virtual reality goggles.” (Jaszlics, 10:48-57 (“Observer sensors and controls **115** (in FIG. 2) are devices using existing technology....The position and orientation of the observer (including the movement and attitude of the vehicle, if any, housing the observer) is sensed by observer sensors and controls **115** such as a magnetic or infrared head tracker system used in conjunction with virtual reality goggles.”), 10:26-34 (“Observer actions also include interactions of the observer with the real world, such as head movement of the observer....The observer’s interactions with the real world also include the movement of the observation point (in the case of a battle tank, the movement of the vehicle and rotation of the turret), and the resulting changes of three-dimensional position and attitude.”).) Three-dimensional “attitude” includes pitch, roll, and yaw. (Cooperstock, ¶93 (citing EX1015, p.004 (“Attitude often is expressed in terms of pitch, roll, and yaw.”); EX1005, 4:62-64 (“A viewer head attitude monitor **38** is provided for monitoring the attitude of the

viewer's head. By ‘attitude’ is meant the same concept used in regard to aircraft pitch, roll and yaw.’’)).)

Although Jaszlics states that the sensors are “used in conjunction” with goggles, Jaszlics does not appear to expressly state that determining “attitude” involves determining “**pitch**” and “**roll**” “**of said head-mounted display.**” This would have been obvious, however, based on Jaszlics’s disclosures regarding a mobile individual and using head-mounted goggles/visor. It would have been obvious, and imperative, to a person of ordinary skill in the art to use observer sensors to determine pitch and roll of the user’s head-mounted display in order to correctly overlay virtual entities in the user’s field of view. (Cooperstock, ¶94.) Without pitch and roll information regarding the head-mounted display, the virtual entities would not be properly registered to their intended locations from the user’s perspective. (*Id.*) For example, a virtual tank might be incorrectly placed over the sky instead of appearing at ground level. This imperative is recognized in Jaszlics, which explains that “[c]hanges 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.” (Jaszlics, 11:43-47; Cooperstock, ¶94.)

Moreover, **Rallison** expressly discloses determining “**pitch**” and “**roll**” “**of [a] head-mounted display.**” (Cooperstock, ¶95.) Rallison describes a head-worn “tracker” device “for outputting an indication of the orientation, attitude and/or position of a head-mounted display (HMD).” (Rallison, Abstract; *see also id.*, 17:50-55 (“[O]ne or more trackers can be integrally built into the head-mounted display device.”).) The tracker can use different types of sensors, such as “magnetic sensors” or “one or more inertial sensors, such as a rate gyro and/or accelerometers.” (Rallison, Abstract.) These sensors are used to detect, among other things, pitch and roll. (Rallison, 5:5-17 (“In one embodiment, inertial sensors are used for both yaw sensing and pitch/roll sensing such as by using a rate gyro for yaw sensing and two accelerometers for sensing pitch and/or roll, respectively.”))

The combination of Rallison’s teachings with Jaszlics would have predictably resulted in “**determining a pitch of said head-mounted display [and] determining a roll of said head-mounted display**” as claimed. (Cooperstock, ¶95.) The rationale and motivation to combine Jaszlics and Rallison discussed for claim 1 [a] applies here as well. (*Id.*) In addition, as noted, the imperative of determining (and using) pitch and roll of the head-mounted display in order to provide an effective, realistic combined reality experience would have been readily apparent to a person of ordinary skill in the art. (*Id.*)

With respect to “**determining a height of said head-mounted display**,” this is also disclosed by and obvious over Jaszlics. (Cooperstock, ¶96.) Jaszlics describes using GPS and an altimeter to “determine the three-dimensional position of the observer.” (Jaszlics, 16:28-32.) A person of ordinary skill in the art would have understood and found it obvious that the altimeter would be used to determine a height of the head-mounted display, at least based on Jaszlics’ disclosures regarding a mobile individual and using head-mounted goggles/visor. (Cooperstock, ¶96.)

Maguire [EX1005] provides further confirmation of how a person of ordinary skill in the art would have understood Jaszlics’ use of an altimeter. (Cooperstock, ¶97.) Maguire, entitled “Apparatus and Method for Providing Real and Virtual Objects in a Head Mounted Display,” describes an augmented reality head-mounted display apparatus in which an altimeter is similarly “used to monitor the height of the viewer’s head above the floor.” (Maguire, 4:53-57 (“A vertical position monitor **34** such as an altimeter may be used to monitor the height of the viewer’s head above the floor. A vertical position signal is provided on a line **36** to the computer and image processor.”).)

As with pitch and roll, a person of ordinary skill in the art would have readily appreciated the benefits of determining (and using) height of the head-mounted display in order to provide an effective, realistic combined reality experience by

helping to ensure that virtual entities were correctly overlaid in the user's display.

(Cooperstock, ¶98.)

4. **Claim 20: “The non-transitory computer-readable medium of claim 1, further comprising utilizing manual controls, wherein a pitch of said head-mounted display is determined and a roll of said head-mounted display is determined.”**

Jaszlics further discloses and renders obvious “**utilizing manual controls**” such as using a joystick or mouse. (Cooperstock, ¶99.) Jaszlics explains that “[o]bserver 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 applicable to a specific implementation of the invention.” (Jaszlics, 10:34-38.) Jaszlics further explains that “[o]bserver 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.” (Jaszlics, 11:9-13.)

The remainder of claim 20, “**a pitch of said head-mounted display is determined and a roll of said head-mounted display is determined,**” is substantively identical to claim 13 (“**determining a pitch of said head-mounted display, determining a roll of said head-mounted display**”) and therefore applies here as well. (Cooperstock, ¶100.)

VII. CONCLUSION

Petitioner respectfully requests IPR institution.

Petition for *Inter Partes* Review of
U.S. Patent No. 10,179,277 B2

Dated: March 25, 2025

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE WITH WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), I certify that this petition complies with the type-volume limits of 37 C.F.R. § 42.24(a)(1)(i) because it contains 6,829 words, according to the word-processing system used to prepare this petition, excluding the parts of this petition that are exempted by 37 C.F.R. § 42.24(a) (including the table of contents, a table of authorities, mandatory notices, a certificate of service or this certificate word count, appendix of exhibits, and claim listings).

DATED: March 25, 2025

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CERTIFICATE OF SERVICE

I hereby certify, pursuant to 37 C.F.R. Sections 42.6 and 42.105, that a complete copy of the attached **PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 10,179,277 B2**, including all exhibits (**Nos. 1001-1005, 1011-1012, 1014-1016, 1018**) and related documents, are being served via Federal Express on the 25th day of March, 2025, the same day as the filing of the above-identified document in the United States Patent and Trademark Office/Patent Trial and Appeal Board, upon Patent Owner by serving the correspondence address of record with the USPTO as follows:

32733 - JEFFREY D. MULLEN
2212 Hassinger Lane
Glenshaw, PA 15116
UNITED STATES

And, via Federal Express upon counsel of record for Patent Owner in the litigation pending before the U.S. District Court for the Western District of Texas entitled *Mullen Industries LLC v. Meta Platforms, Inc.*, Case No. 1:24-cv-00354-DAE (W.D. Tex.) as follows:

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