UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF FLORIDA
ORLANDO DIVISION

D3D TECHNOLOGIES, INC., Plaintiff, v. MICROSOFT CORPORATION, Defendant.	Case No.: 6:20-cv-01699-PGB-DCI **SECOND AMENDED AND SUPPLEMENTAL COMPLAINT AND DEMAND FOR JURY TRIAL** **(INJUNCTIVE RELIEF SOUGHT)**

Plaintiff D3D Technologies, Inc. ("D3D"), by and through undersigned counsel, brings this suit against Defendant Microsoft Corporation ("Microsoft" or "Defendant") and, pursuant to Rule 8 of the Federal Rules of Civil Procedure, alleges as follows:

PARTIES

1. Plaintiff D3D Technologies, Inc., is a Florida Profit Corporation with its principal place of business located at 1700 Jake Street, Unit 211, Orlando, FL 32814. D3D's corporate headquarters is located in Orlando, and it employs numerous engineers, software developers and scientists in Orlando who perform research and product development tasks for D3D's 3D imaging technologies, under the guidance and direction of Dr. David Douglas, Medical Advisor at D3D, and Dr. Robert Douglas, Chief Technology Officer at D3D. Dr. David Douglas and Dr. Robert Douglas are residents of Florida and are the inventors of the D3D patents at issue. D3D has strong and continuous ties to the Orlando area, having been engaged in

research, product development and business activities in the Orlando area for over 10 years.

2. Microsoft Corporation is a Washington Corporation with its principal place of business located at One Microsoft Way, Redmond, Washington 98052. Microsoft is a publicly traded company, with offices and locations all over the world – including within the State of Florida. Within this judicial district Microsoft has a corporate sales office located at 5426 Bay Center Drive, Suite 700, Tampa, FL 33609 and multiple retail stores located at:

a. 4200 Conroy Road, Suite 220, Orlando, FL 32839;

b. 8001 South Orange Blossom Trail, Suite 1120B, Orlando, FL, 32809;

c. 140 University Town Center Drive, Sarasota, Florida 34243; and

d. 2223 North West Shore Boulevard, Tampa, FL 33607.

Further, Microsoft is registered to conduct business in Florida (Florida Taxpayer ID 91-1144442) and may be served via its registered agent Corporation Service Company located at 1201 Hays Street, Tallahassee, FL 32301.

JURISDICTION AND VENUE

3. This is a civil action for patent infringement arising under the Patent Laws of the United States as set forth in 35 U.S.C. §§ 271, *et seq.*

4. This Court has federal subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a) and pendent jurisdiction over the other claims for relief asserted herein.

5. This Court has personal jurisdiction because Defendant has minimum contacts with this forum as a result of business regularly conducted within the State of Florida and within this judicial district, and, specifically as a result of, at least, committing the tort of patent infringement within Florida and this judicial district. Personal jurisdiction also exists because Defendant, *inter alia*:

a. engages in substantial and not isolated interstate activity in Florida;

b. has substantial, continuous, and systematic business contacts in this judicial district;

c. owns, manages, and operates facilities within this judicial district (*e.g.*, the corporate sales office in Tampa and four retail stores across Orlando, Sarasota, and Tampa as described in Paragraph 2);

d. actively advertises to residents within this judicial district to purchase infringing products;

e. actively advertises to residents of this judicial district to work for Microsoft;

f. employs residents from this judicial district;

g. operates, conducts, and engages in business within the State of Florida;

h. continues to conduct such business in Florida through the continued operation within this judicial district;

i. operates Internet websites, *e.g.*, https://www.microsoft.com/en-us/ (last visited April 5, 2021), and https://www.microsoft.com/en-us/hololens

(last visited April 5, 2021), which are available to and accessed by customers and potential customers of the Defendant within this judicial district, and advertises and makes available for purchase within this judicial district Defendant's infringing products:

j. attends numerous annual conferences held within this judicial district, *e.g.*, the annual Interservice/Industry Training, Simulation and Education Conference (I/ITSEC) which was held in Orlando, Florida for at least the last 5 years; and

k. hosts annual conferences within this judicial district, *e.g.*, Microsoft' Ignite Conference which has been held in Orlando, Florida for at least the last 3 years. *See Microsoft Ignite 2019,* Microsoft, <https://news.microsoft.com/ignite2019/> (last visited April 5, 2021).

Accordingly, this Court's jurisdiction over the Defendant comports with Florida's long-arm statute and the constitutional standards of fair play and substantial justice and arises directly from the Defendant's purposeful minimum contacts with the State of Florida.

6. This Court also has personal jurisdiction over the Defendant because it has purposefully and voluntarily availed itself of the privilege of conducting business in the United States, the State of Florida, and, specifically, this judicial district by continuously and systematically placing goods and services into the stream of commerce through an established distribution channel with the expectation that such

goods and services will be purchased by consumers within the United States, Florida, and this judicial district. Defendant, either directly and/or through intermediaries, uses, sells, offers to sell, distributes, advertises, and/or otherwise promotes the accused products in this judicial district.

7. Microsoft has partnered with at least 163 other companies with respect to its infringing HoloLens product, many of which are located or otherwise have locations within the State of Florida and, specifically, this judicial district, *see HoloLens 2, Find a Partner*, Microsoft, https://www.microsoft.com/en-us/hololens/partners (last visited April 5, 2021), and are available to and accessed by customers and potential customers of the Defendant within this judicial district. On information and belief, Microsoft's products are sold to and used by the following third-party partners, *inter alia*:

a. Booz Allen Hamilton located at 4890 West Kennedy Blvd., Suite 475, Tampa, Florida 33609.

b. CAE Healthcare located at 6300 Edgelake Drive, Sarasota, Florida 34240.

c. General Electric with locations at 501 E. Kennedy Blvd., Suite 600, Tampa, FL 33602 and 7802 Woodland Center Blvd., Tampa, FL 33614.

d. Insight with locations at 100 Rialto Pl., Suite 615, Melbourne, FL 32901, 2701 N. Rocky Point Dr., Suite 300, Tampa, FL 33607, and 302 Knights Run Ave., Suite 1175, Tampa, FL 33602.

Further, Microsoft is continually advertising and recruiting new HoloLens partners, such as independent software vendors, system integrators, and digital agencies, both in and out of this judicial district. *See Mixed Reality Partners*, Microsoft, https://www.microsoft.com/en-us/hololens/mixed-reality-partners (describing benefits of partnership) (last visited April 5, 2021); *Mixed Reality Partner Program*, Microsoft, https://www.microsoft.com/en-us/hololens/mrpp (describing requirements and application for partnership) (last visited April 5, 2021).

8. Venue is proper in this Court under 28 U.S.C. §§ 1391(b), (c), (d) and 28 U.S.C. § 1400(b) because Defendant has committed or induced acts of infringement, and/or advertise, market, sell, and/or offer to sell products, including infringing products, in this judicial district, as discussed, *supra*, in Paragraphs 2 and 5-7 which are incorporated by reference herein. As stated, *supra*, Microsoft has significant ties to, and presence in, the State of Florida and the Middle District of Florida, making venue in this judicial district both proper and convenient for this action. As stated in Paragraph 1, D3D's principal place of business is located within this district.

THE PATENTS-IN-SUIT

9. On February 26, 2013, United States Patent No. 8,384,771 ("the '771 patent"), entitled "Method and Apparatus for Three Dimensional Viewing of Images," was duly and legally issued by the United States Patent and Trademark Office ("USPTO") to David Bryon Douglas, with D3D Technologies, Inc. as the ultimate assignee. A copy of the '771 patent is attached hereto as **Exhibit 1**.

10. On May 24, 2016, United States Patent No. 9,349,183 ("the '183 patent"), entitled "Method and Apparatus for Three Dimensional Viewing of Images," was duly and legally issued by the USPTO to David Bryon Douglas and Robert E. Douglas, with D3D Technologies, Inc. as the ultimate assignee. A copy of the '183 patent is attached hereto as **Exhibit 2**.

11. On October 16, 2016, United States Patent No. 9,473,766 ("the '766 patent"), entitled "Method and Apparatus for Three Dimensional Viewing of Images," was duly and legally issued by the USPTO to David Bryon Douglas and Robert E. Douglas, with D3D Technologies, Inc. as the ultimate assignee. A copy of the '766 patent is attached hereto as **Exhibit 3**.

12. On May 29, 2018, United States Patent No. 9,980,691 ("the '691 patent"), entitled "Method and Apparatus for Three Dimensional Viewing of Images," was duly and legally issued by the USPTO to David Bryon Douglas and Robert E. Douglas, with D3D Technologies, Inc. as the ultimate assignee. A copy of the '691 patent is attached hereto as **Exhibit 4**.

13. On October 6, 2020, United States Patent No. 10,795,457 ("the '457 patent"), entitled "Interactive 3D Cursor," was duly and legally issued by the USPTO to D3D Technologies, Inc. A copy of the '457 patent is attached hereto as **Exhibit 11**.

14. The '771, '183, '766, '691, and '457 patents are referred to hereinafter as "the D3D Patents."

15. Plaintiff D3D is the owner of the entire right, title, and interest in and to the D3D Patents, with the right to sue in its own name.

a. Assignment of the '771 patent to D3D Technologies, Inc. (formerly D3D Enterprises, LLC) was executed on June 22, 2016 and recorded with the USPTO on June 27, 2016.

b. Assignment of the '183 patent to D3D Technologies, Inc. (formerly D3D Enterprises, LLC) was executed between June 22, 2016 and June 23, 2016 and recorded with the USPTO on June 27, 2016.

c. Assignment of the '766 patent to D3D Technologies, Inc. was executed on June 7, 2019 and recorded with the USPTO on May 8, 2020.

d. Assignment of the '691 patent to D3D Technologies, Inc. was executed on June 7, 2019 and recorded with the USPTO on May 8, 2020.

e. D3D Technologies, Inc. was both the original applicant and original assignee of the '457 patent.

16. Each of the D3D Patents are presumed valid under 35 U.S.C. § 282.

17. The D3D patents are directed to improvements in three-dimensional imaging technology. More specifically, the patents are directed at voxel-based dataset modeling of three dimensional images that can be further processed, such as, for example, (i) viewing a volume of interest from alternate viewpoints; (ii) filtering a volume of interest; (iii) enhancing a volume of interest via colorization; and (iv) zoom-in viewing of a volume of interest. Other improvements of certain of the D3D patents

are directed at convergence (*i.e.*, viewing a close object), viewing with polarized lenses, and the incorporation of 3D cursor technologies, to selectively view portions of the volume of interest, and to conduct further processing on the selected voxels.

THE D3D TECHNOLOGY

18. D3D Technologies, Inc. was founded to create improved three-dimensional imaging technology. Traditionally, voxelated datasets (*e.g.*, Computed Tomography (CT) scans and Magnetic Resonance Imaging (MRI) scans) were viewed on 2D monitors using a slice-by-slice scrolling technique. D3D transformed the way the voxelated datasets are viewed, and the patented technology is known as true Depth-3-Dimensional (D3D) imaging. The D3D technology dates back to 2006 and forms the basis for all the patents-at-issue. The patented technology is directed to arranging two dimensional image slices to build a three dimensional voxelated volume that can be stereoscopically rendered into different left and right eye viewing perspectives, which was not well-understood, routine, or conventional at the time of the invention. *See, e.g.,* David B. Douglas et al., *Augmented reality: Advances in Diagnostic Imaging*, Multimodal Tech. & Interaction (2017), available at https://doi.org/10.3390/mti1040029 (last visited April 5, 2021) (cited 21 times in the scientific literature). The resulting 3D image processing technique is particularly useful for viewing via an augmented reality, virtual reality, or mixed reality head display unit, and has wide applicability across numerous disciplines, including medical applications, military applications, and use in gaming systems, to name a few.

19. The foundational nature of the D3D technology for use in medical applications, namely creating 3D voxelated volumes from 2D voxelated slices, was recognized by a National Institutes of Health (NIH) fact sheet:

> [A] narrow beam of x-rays is aimed at a patient and quickly rotated around the body, producing signals that are processed by the machine's computer to generate cross sectional images—or "slices"—of the body… Once a number of successive slices are collected by the machine's computer, they can be digitally "stacked" together to form a three-dimensional image of the patient that allows for easier identification and location of basic structures as well as possible tumors or abnormalities.

Nat'l Inst. of Biomedical Imaging & Bioengineering, Nat'l Inst. of Health, *Computed Tomography (CT) Fact Sheet* (Mar. 2016), https://www.nibib.nih.gov/sites/default/files/CT% 20Fact % 20Sheet 2016_508.pdf (last visited April 5, 2021). Notably, the NIH fact sheet was published in March 2016, nearly a decade after D3D filed their patent applications.

20. D3D's same 3D imaging technology provides vast improvements over the prior art in other non-medical fields, where it is critical to create and develop three-dimensional images allowing for depth or volume imaging. Video gaming is one ubiquitous application for 3D imaging, whether by forming the gaming characters themselves or the detailed 3D landscapes on which the games play out. There are numerous industrial applications, including using 3D images for training machine operators, facilitating machine diagnostics and repairs, or providing routine machine maintenance instructions accompanied by 3D illustrations. Scientific data (*e.g.,* the Geographic Information System (GIS)) utilize voxelated datasets to form volumetric

features, such as landscape and urban features. The ability to generate realistic 3D landscapes and 3D models of people is also critical in military applications, whether for training or for conducting actual military operations. This unique technology, when combined with augmented reality, virtual reality, or mixed reality headsets, allows a viewer to rotate, converge and even zoom-in on an image from different viewpoints. Especially in military applications, the ability to see images from a true 3D perspective will be a great advantage.

21. D3D is an operating company that is dedicated to developing, manufacturing, selling and/or licensing its technology across various industries. It is currently developing a product for sale that incorporates D3D's patented technology for medical applications for detecting brain aneurysms. With support from the National Science Foundation (NSF), D3D has transformed its initial prototype into a beta test version, performed user acceptance tests, and tested diagnostic speed and diagnostic accuracy of complex anatomic structures for brain aneurysms. Briefly, from a public health perspective, there are nearly 1 million brain aneurysm ruptures worldwide every year resulting in nearly 500,000 deaths. Approximately half of the victims are younger than 50 years old. Among survivors, nearly 66% suffer permanent neurological deficits. Nearly 6.5 million people in the United States have an un-ruptured brain aneurysm. Accurate early diagnosis of brain aneurysms is critically important because if un-ruptured brain aneurysms can be detected, they can be treated with a minimally invasive technique that would prevent future aneurysm rupture. In

addition to improving diagnostic accuracy and treatment planning of brain aneurysms, the advanced D3D 3D visualization system holds promise in improving cancer imaging. D3D has performed over 30 customer interviews and aims to achieve Food and Drug Administration (FDA) approval in the fall of 2020 for its medical imaging software.

THE INVENTORS OF THE D3D TECHNOLOGY

22. Dr. David Douglas and Dr. Robert Douglas are the inventors of the patents-in-suit.[1]

23. Dr. David Douglas serves as the D3D Medical Advisor. He majored in physics at the U.S. Air Force Academy, completed a M.D. from Georgetown and a M.P.H. from Harvard University. His post-graduate training included General Surgery Internship and Diagnostic Radiology Residency at the University of California, Davis. Then, he went to Stanford University where he was the first ever neuroradiology fellow to complete dual neuroradiology-nuclear medicine fellowships. He is now a dual board certified neuroradiologist-nuclear medicine physician licensed in California. As a physician and a scientist, Dr. David Douglas focuses on bringing advanced imaging techniques into clinical medicine, and that focus led to the innovations that evolved into the patents at issue.

24. Dr. David Douglas has experience working in various military positions, including serving in Afghanistan as the Commander of Radiology. Presently, he serves

[1] Dr. Katherine Douglas is also a named inventor on the '457 patent.

as an Active Duty Lieutenant Colonel in the United States Air Force and as an Adjunct Clinical Assistant Professor in both Nuclear Medicine and Neuroradiology at Stanford University. Dr. Douglas' achievements have been recognized by his peers. His accolades include receiving the Stanford Outstanding Fellow Teacher Award, the Travis Air Force Base Outstanding Faculty Teaching Award, the Henkin Government Relations Fellowship with the Society of Nuclear Medicine and Molecular Imaging (SNMMI), the Slosky Professional Relations Fellowship at the SNMMI and the American College of Radiology (ACR) Goldberg-Reeder Travel Grant for humanitarian work in Kenya. Dr. David Douglas also serves on the Radiological Society of North America (RSNA) Public Information Advisors Network (PIAN) for his expertise in Augmented Reality and Virtual Reality.

25. Dr. Robert Douglas serves as the D3D Chief Technology Officer. He graduated from U.S. Military Academy at West Point and was the top 1% of his class in engineering. During his Army career he was an Airborne Ranger having a range of experiences from combat tours as an Infantryman in Vietnam, to tours with the United Nations in the Middle East, to the Joint Chiefs of Staff studying nuclear weapons.

26. Dr. Robert Douglas received his PhD from the University of Central Florida and was awarded the Personal Achievement Award by the College of Engineering. He has a wide breadth of experience in military programs and imaging applications. He joined Martin Marietta, later to be part of Lockheed Martin, where he was director of systems analysis responsible for analysis of a range of advanced

weapons systems including fire control for Air Force fighters (F-22 and F-35); JASSM cruise missile; Army Javelin and Hellfire missiles, Longbow radar; MEADS air defense system; and Copperhead guided projectile. He later joined DRS Technologies as Vice President, Engineering with a focus on thermal imaging systems for Army combat vehicles (M1 Abrams tank and M2 Bradley Infantry Fighting Vehicle), combat aviation (AH-64 and OH-58D), and thermal imaging for infantry weapons and helmets. Dr. Robert Douglas also served on the Army Science Board for over 20 years and chaired seven major studies for the Board.

D3D'S INTERACTIONS WITH MICROSOFT

27. Microsoft is well aware of D3D's patented technology and its implication for Microsoft's HoloLens products. Dr. Robert Douglas knows Dr. Peter Lee, Microsoft's Corporate Vice President of Research and Incubation, on a personal level through multiple Army Science Board meetings. On October 5, 2016, Dr. Peter Lee was notified via email by Dr. Robert Douglas of D3D's technologies and D3D's desire to work with Microsoft. In the October 5, 2016 email, Dr. Robert Douglas requested a 30-minute follow up meeting to discuss and demonstrate the D3D technology. Dr. Robert Douglas also attached an article whose lead author was his son, Dr. David Douglas, an inventor of the patented technology. The article entitled, "Augmented Reality Imaging System: 3D Viewing of a Breast Cancer," describes the D3D imaging technology and cites D3D's '771 and '183 patents in the opening paragraphs. Dr. Peter Lee did not respond to Dr. Robert Douglas.

28. Subsequently, on August 28, 2017, Dr. David Douglas attended the Military Health Systems Research Symposium in Kissimmee, Florida. During the symposium, Dr. David Douglas saw a demonstration by Microsoft for a new product called HoloLens. Dr. David Douglas spoke with Ms. Stacy Brown, Microsoft's Senior Account Executive for Federal Sales, and Mr. Michael Erickson, who at the time, was Microsoft's Director Lead of a team providing custom Application Specific Integrated Circuits (ASICs) for products including the HoloLens. On information and belief, Mr. Erickson is now Principal ASIC Engineer, and a technical lead for Microsoft's infringing HoloLens product.

29. At this time, Dr. David Douglas, the primary inventor of D3D's patented technology, provided detailed information to Ms. Brown and Mr. Erickson on D3D's technology and how that technology was relevant to the HoloLens product. Dr. David Douglas wanted to foster a mutually beneficial collaboration between D3D and Microsoft. Dr. David Douglas discussed D3D's issued and pending patents for the specific purpose of establishing a D3D-Microsoft collaboration or license to the patented technology. In fact, Dr. David Douglas physically showed (on his laptop) the '771 patent and two of D3D's publications in peer reviewed journals to Ms. Brown and Mr. Erickson. Dr. David Douglas further informed Ms. Brown and Mr. Erickson that D3D's technology, including patented features and prospective patented features, would greatly improve Microsoft's HoloLens product. In doing so, Dr. David Douglas explicitly told Ms. Brown and Mr. Erickson that Microsoft's HoloLens already used

important features that were patented by D3D. While wearing the HoloLens device, and trying different features and elements of the product, Dr. David Douglas explained to Mr. Erickson and Ms. Brown that the HoloLens performed certain of D3D's patented features, including, *inter alia*:

a. a filtering process as patented by D3D;

b. generating volumes by arranging slices as patented by D3D;

c. stereoscopic 3D imaging as patented by D3D; and

d. zooming in with convergence point shifting as patented by D3D.

30. Below is an image of Dr. David Douglas wearing the HoloLens at the symposium. Mr. Erickson took the photo.

31. Dr. David Douglas also provided Ms. Brown and Mr. Erickson publications from the Journal of Medical Devices and Journal of Nature and Science that described D3D's patented technology. Each of the publications referenced D3D's '771 patent. Mr. Erickson expressed interest in D3D's patented technology, and after the meeting, Dr. David Douglas sent an email to Ms. Brown and Mr. Erickson,

attaching his CV and the two identified publications they had discussed, which reference the '771 and '183 patents. Despite the volume of information provided, and Microsoft expressing interest in D3D's technology, Dr. David Douglas never heard back from Microsoft.

32. Despite providing Microsoft numerous opportunities to license D3D's patented technology and/or explore a business relationship between the companies focused on D3D's patented technology, Microsoft did not respond. Dr. David Douglas reached out to Microsoft personnel one more time. On May 7, 2019, Dr. David Douglas sent another email to Mr. Erickson wherein he identified the '771, '183, '766, and '691 patents at issue here and described to Microsoft how the patents have applications to a wide range of fields which are important to Microsoft, including gaming, medical and military. Again, despite the overture and the information provided, Microsoft never responded.

COUNT I
INFRINGEMENT OF THE '771 PATENT

33. Plaintiff D3D repeats and realleges the above paragraphs 1 through 32, which are incorporated by reference as if fully restated herein.

34. Plaintiff D3D is the owner by assignment of all right, title, and interest in and to the '771 patent, including the right to recover for any and all infringement thereof.

35. Defendant is not licensed or otherwise authorized to practice the '771 patent.

36. Plaintiff D3D has not licensed or otherwise authorized Defendant under the '771 patent.

37. The '771 patent is valid and enforceable, and presumed valid under 35 U.S.C. § 282.

38. The '771 patent relates to, among other things, methods, apparatus, and computer program products for three-dimensional viewing and manipulation of images.

39. On information and belief, Defendant has infringed the '771 patent by making, having made, using, importing, providing, supplying, distributing, testing, selling, or offering for sale a method, apparatus, and computer program product for three-dimensional viewing and manipulation of images, as described and claimed in the '771 patent. For example, Microsoft's HoloLens 1 and HoloLens 2,[2] each as described in more detail *infra*, infringe the '771 patent.

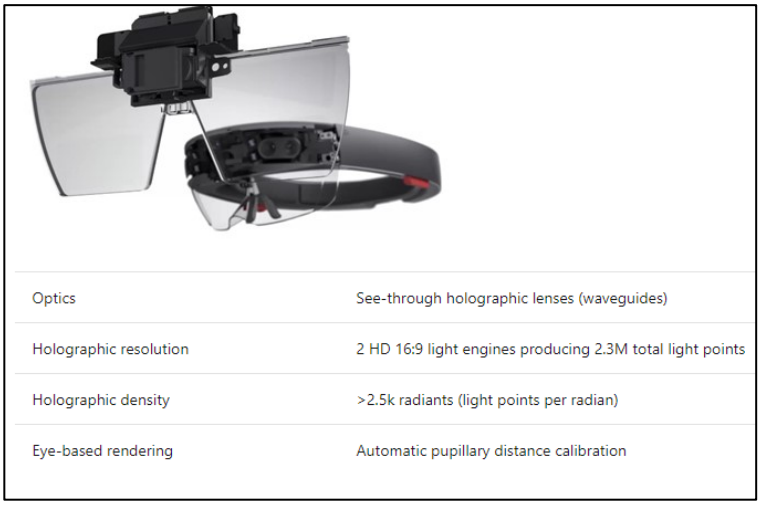
a. Microsoft's HoloLens 1

According to Microsoft, the ***Microsoft HoloLens 1*** "redefines personal computing through holographic experiences," blending "cutting-edge optics and sensors to deliver 3D holograms pinned to the real world." *See*

[2] In light of the Court's Order (Doc. No. 59), IVAS-based infringement claims are no longer part of this case but may instead be pursued in the Court of Federal Claims. As such, references to IVAS have been removed from the body of this Second Amended Complaint and the associated claim charts (**Exhibits 5-8 and 12**).

HoloLens (1st gen) Hardware, Microsoft, https://docs.microsoft.com/en-us/hololens/hololens1-hardware (last visited April 5, 2021).

Source: https://docs.microsoft.com/en-us/hololens/hololens1-hardware (last visited April 5, 2021).



Optics	See-through holographic lenses (waveguides)
Holographic resolution	2 HD 16:9 light engines producing 2.3M total light points
Holographic density	>2.5k radiants (light points per radian)
Eye-based rendering	Automatic pupillary distance calibration

Source: https://docs.microsoft.com/en-us/hololens/hololens1-hardware (last visited April 5, 2021).

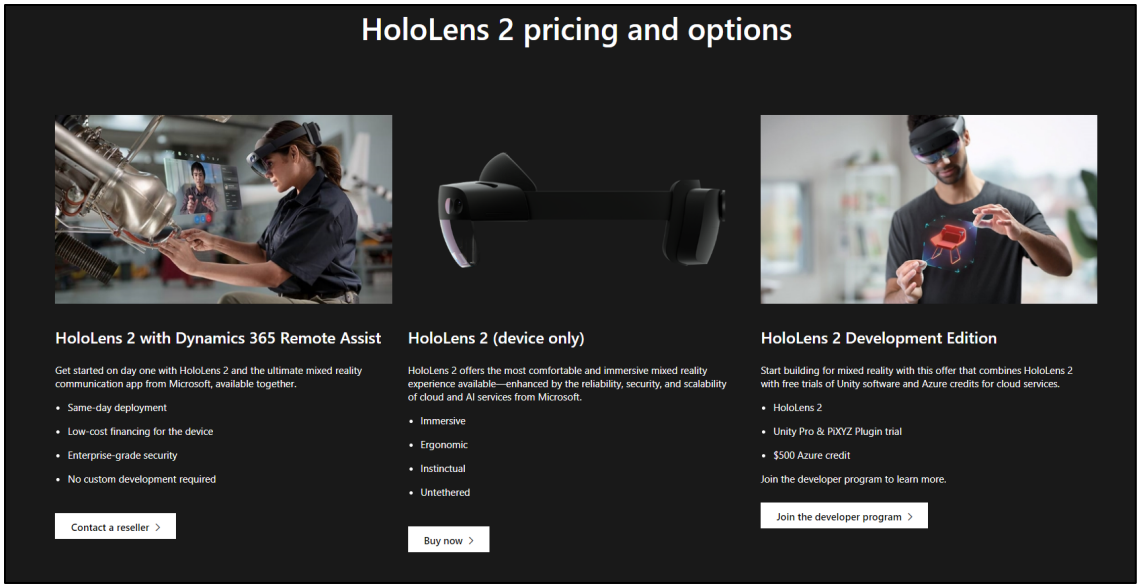
b. Microsoft's HoloLens 2

According to Microsoft, the ***Microsoft HoloLens 2***, "refines the holographic computing journey stated by [HoloLens 1] to provide a more comfortable and immersive experience paired with more options for collaborating in mixed reality." *See HoloLens 2 Hardware*, Microsoft,

https://docs.microsoft.com/en-us/hololens/hololens2-hardware (last visited April 5, 2021).

Source: https://www.microsoft.com/en-us/hololens/hardware# (last visited April 5, 2021).

Source: <https://www.microsoft.com/en-us/p/holoLens-2/91pnzzznzwcp/?activetab=pivot:overviewtab> (last visited April 5, 2021)



Source: <https://www.microsoft.com/en-us/hololens/buy> (last visited April 5, 2021).

40. On information and belief, Defendant continues to engage in infringing acts, as described, *supra*, with knowledge of the '771 patent at least no later than October 5, 2016 per D3D correspondence with Microsoft as described in Paragraphs 27-32, and certainly not later than August 28, 2017 per Dr. David Douglas's in person conversation with Microsoft personnel, and with the actual intent to cause the acts which it knew or should have known would directly infringe, individually or jointly, and induce actual infringement.

Defendant's Direct Infringement of the '771 Patent:

41. On information and belief, in violation of 35 U.S.C. § 271(a), Defendant has directly infringed, continues to directly infringe, and will continue to directly infringe, individually or jointly, absent this Court's intervention one or more claims of the '771 patent, including for example at least claims 1-21 of the '771 patent, either literally or under the doctrine of equivalents, by making, distributing, using, testing,

selling, and/or offering to sell within the United States, or importing into the United States, without license or authority, Defendant's suite of virtual reality and augmented reality products, including, but not limited to, the HoloLens 1 and HoloLens 2.

Direct Infringement Allegations

42. ***Direct Infringement Claim Charts***: **Exhibit 5** illustrates how Microsoft's HoloLens 1 and HoloLens 2 systems infringe the claimed methods, computer readable mediums, and computer systems – with the computer system claims being used as representative of all the claims. Such supplied evidence is illustrative, and not exhaustive. Further, a person of ordinary skill in the art would readily recognize the broader implications of these representative materials.

43. On information and belief, as demonstrated in **Exhibit 5** (claim 15 is representative), and by way of example only, Defendant Microsoft performs each limitation of claim 1 of the '771 patent:

> "1. A method of three-dimensional viewing of images by a user comprising:
> selecting a volume of interest from a collection of image slices;
> arranging said slices corresponding to said volume of interest;
> selecting an initial viewing angle of said slices;
> selecting a first viewpoint for a left eye;
> selecting a second viewpoint for a right eye, wherein said first viewpoint and said second viewpoint are different viewpoints;
> displaying, in a head display unit (HDU), a first image for said left eye based on said initial viewing angle, said first viewpoint for said left eye and said volume of interest;
> displaying, in said HDU, a second image for said right eye based on said initial viewing angle, said second viewpoint for said right eye, and said volume of interest and wherein said first image for said left eye and said second image for said right eye produce a three-dimensional image to said user; and
> selecting items of said image to be filtered, wherein said selecting items of said image to be filtered comprises:

selecting items of said image to be subtracted from said image to produce a filtered image;

displaying, in said HDU, a filtered image for said left eye based on said initial viewing angle, said view point for said left eye and said volume of interest; and

displaying, in said HDU, a filtered image for said right eye based on said initial viewing angle, said view point for said right eye, and said volume of interest and wherein said filtered image for said left eye and said filtered image for said right eye produce a filtered three-dimensional image to said user."

44. On information and belief, as demonstrated in **Exhibit 5** (claim 15 is representative), and by way of example only, Defendant Microsoft performs each limitation of claim 8 of the '771 patent:

"8. A non-transitory computer readable medium having computer readable code thereon for three-dimensional viewing of images by a user, the medium comprising:

instructions for selecting a volume of interest from a collection of image slices;

instructions for arranging said slices corresponding to said volume of interest;

instructions for selecting an initial viewing angle of said slices;

instructions for selecting a first viewpoint for a left eye;

instructions for selecting a second viewpoint for a right eye, wherein said first viewpoint and said second viewpoint are different viewpoints;

instructions for displaying, in a head display unit (HDU), a first image for said left eye based on said initial viewing angle, said first viewpoint for said left eye and said volume of interest;

instructions for displaying, in said HDU, a second image for said right eye based on said initial viewing angle, said second viewpoint for said right eye, and said volume of interest and wherein said image for said left eye and said image for said right eye produce a three-dimensional image to said user; and

instructions for selecting items of said image to be filtered, wherein said instructions for selecting items of said image to be filtered comprises:

instructions for selecting items of said image to be subtracted from said image to produce a filtered image;

instructions for displaying, in said HDU, a filtered image for said left eye based on said initial viewing angle, said view point for said left eye and said volume of interest; and

instructions for displaying, in said HDU, a filtered image for said right eye based on said initial viewing angle, said view point for said right eye, and said volume of interest and wherein said filtered image for said left eye and said filtered image for said right eye produce a filtered three-dimensional image to said user."

45. On information and belief, as demonstrated in **Exhibit 5**, and by way of example only, Defendant Microsoft performs each limitation of claim 15 of the '771 patent:

"15. A computer system comprising:
a memory;
a processor;
a communications interface;
an interconnection mechanism coupling the memory, the processor and the communications interface; and
wherein the memory is encoded with an application providing three-dimensional viewing of images by a user, that when performed on the processor, provides a process for processing information, the process causing the computer system to perform the operations of:
selecting a volume of interest from a collection of image slices;
arranging said slices corresponding to said volume of interest;
selecting an initial viewing angle of said slices;
selecting a first viewpoint for a left eye;
selecting a second viewpoint for a right eye, wherein said first viewpoint and said second viewpoint are different viewpoints;
displaying, in a head display unit (HDU), a first image for said left eye based on said initial viewing angle, said first viewpoint for said left eye and said volume of interest;
displaying, in said HDU, a second image for said right eye based on said initial viewing angle, said second viewpoint for said right eye, and said volume of interest and wherein said image for said left eye and said image for said right eye produce a three-dimensional image to said user; and
selecting items of said image to be filtered, wherein said selecting items of said image to be filtered comprises:
selecting items of said image to be subtracted from said image to produce a filtered image;
displaying, in said HDU, a filtered image for said left eye based on said initial viewing angle, said view point for said left eye and said volume of interest; and

> displaying, in said HDU, a filtered image for said right eye based on said initial viewing angle, said view point for said right eye, and said volume of interest and wherein said filtered image for said left eye and said filtered image for said right eye produce a filtered three-dimensional image to said user."

46. On information and belief, Defendant Microsoft's accused methods, computer readable mediums, and systems (*e.g.*, HoloLens 1 and HoloLens 2) embody each limitation of dependent claims 2-7, 9-14, and 16-21 of the '771 patent. Evidence of such infringement is provided in **Exhibit 5** (dependent claims 16-21 are representative). Reasonable discovery will confirm this infringement.

Defendant's Direct Infringement of the Method Claims

47. Defendant performs the methods recited in claims 1-7 of the '771 patent. Infringement of a method claim requires performing every step of the claimed method. Defendant performs every step of the methods recited in claims 1-7. As set forth *supra*, Defendant performs, for example, the method recited in claim 1, *i.e.*, "1. A method of three-dimensional viewing of images by a user comprising: selecting a volume of interest from a collection of image slices; arranging said slices corresponding to said volume of interest; selecting an initial viewing angle of said slices; selecting a first viewpoint for a left eye; selecting a second viewpoint for a right eye, wherein said first viewpoint and said second viewpoint are different viewpoints; displaying, in a head display unit (HDU), a first image for said left eye based on said initial viewing angle, said first viewpoint for said left eye and said volume of interest; displaying, in said HDU, a second image for said right eye based on said initial viewing angle, said second

viewpoint for said right eye, and said volume of interest and wherein said first image for said left eye and said second image for said right eye produce a three-dimensional image to said user; and selecting items of said image to be filtered, wherein said selecting items of said image to be filtered comprises: selecting items of said image to be subtracted from said image to produce a filtered image; displaying, in said HDU, a filtered image for said left eye based on said initial viewing angle, said view point for said left eye and said volume of interest; and displaying, in said HDU, a filtered image for said right eye based on said initial viewing angle, said view point for said right eye, and said volume of interest and wherein said filtered image for said left eye and said filtered image for said right eye produce a filtered three-dimensional image to said user."

48. Even if one or more steps recited in method claims 1-7 are performed through technologies (*e.g.*, HoloLens 1 and HoloLens 2) not in the physical possession of the Defendant (*e.g.*, in the possession of Microsoft partners, resellers, developers, end-users, etc.), the claimed methods are specifically performed by Microsoft's HoloLens technology. Defendant directly infringes as its VR/AR (Virtual Reality / Augmented Reality) technology dictate the performances of the claimed steps, such as the "selecting a volume," "arranging," "selecting an initial," "selecting a first," "selecting a second," "displaying . . . a first image," "displaying . . . a second image," "selecting items . . . to be filtered," "selecting items . . . to be subtracted," "displaying . . . for said left eye," and "displaying . . . for said right eye" steps recited

in claim 1 of the '771 patent. On information and belief, Defendant's products and services are designed and built by Defendant to perform the claimed steps automatically. On information and belief, only Defendant can modify the functionality relating to these activities; no one else can modify such functionality. Defendant therefore performs all the claimed steps and directly infringes the asserted method claims of the '771 patent, as demonstrated in **Exhibit 5** (claim 15 is representative).

49. ***Additionally or alternatively***, to the extent third parties or end-users perform one or more steps of the methods recited in claims 1-7 of the '771 patent, any such action by third parties or end-users is attributable to Defendant, such that Defendant is liable for directly infringing such claims in a multiple actor or joint infringement situation, because Defendant directs or controls the other actor(s). In this regard, Defendant conditions participation in activities, as well as the receipt of benefits, upon performance of any such step by any such third party or end-user. Defendant retains control over how the accused methods are performed (*e.g.*, by having built and designed its products and services, for example the HoloLens 1 and HoloLens 2 to automatically perform the claimed method limitations). Defendant exercises control over the methods performed by *e.g.*, the HoloLens 1 and HoloLens 2, and benefits from others' use, including without limitation creating and receiving ongoing revenue streams from the accused products and related goods, and improvement/enhancement of its products and related goods. End-users and third parties receive a benefit from fiscal gains (*e.g.*, third-party resellers; partners increasing

the value of their own products and services) and through VR/AR capabilities (which have both recreational and professional benefits across a broad spectrum of applications (*e.g.*, medical care, military operations, construction, industry, education, science, gaming, etc.)). In fact, VR/AR capabilities form the basis of entire businesses, such as some businesses held by Microsoft partners – over whom Microsoft exercises additional control with requirements for partnership (and for developers). All third-party and end-user involvement with the accused methods, if any, is incidental, ancillary, or contractual.

50. Thus, to the extent that any step of the asserted method claims is performed by someone other than Defendant (*e.g.*, an end-user or third party), Defendant nonetheless directly infringes the '771 patent at least by one or more of: (1) providing products and services (*e.g.*, HoloLens 1 and HoloLens 2) built and designed to perform methods covered by the asserted method claims); (2) dictating via software and associated directions and instructions (*e.g.*, to end-users) the use of the accused products such that, when used as built and designed by Defendant, such products perform the claimed methods; (3) having the ability to terminate others' access to and use of the accused products and related goods and services if the accused products are not used in accordance with Defendant's required terms (*e.g.*, revocation of partnership or developer agreement); (4) marketing and advertising the accused products, and otherwise instructing and directing the use of the accused products in ways covered by

the asserted method claims; and (5) updating and providing ongoing support and maintenance for the accused products.

Defendant's Direct Infringement of the Computer Readable Medium and Computer System Claims

51. Defendant makes, uses, sells, offers to sell, and/or imports the computer readable mediums recited in claims 8-14 and the computer systems recited in claims 15-21. Such claims are infringed when an accused medium and/or accused system, having every element of the claimed medium and/or claimed system, is made, used, sold, offered for sale, or imported within the United States. Defendant makes, uses, sells, offers to sell, and/or imports the accused products (or causes such acts to be performed on its behalf), which possess every element recited in claims 8-14 and claims 15-21, as set forth in more detail *supra* and demonstrated in **Exhibit 5** attached (claims 15-21 are representative). Defendant therefore directly infringes at least the medium claims and system claims of the '771 patent.

52. ***Additionally or alternatively,*** regarding any "use" of the accused systems "by customers," which is a subset of the direct infringement of system claims, Defendant directly infringes in such situations, as Defendant puts the accused systems into service and, at the same time, controls the system as a whole and obtains benefits from it. Defendant provides all components in the system and controls all aspects of its functionality. Although third parties (*e.g.*, Microsoft partners, resellers, developers, etc.) and end-users (*e.g.*, customers) may have physical control over certain aspects of the accused systems, Defendant retains control over how the accused system operates

(*e.g.*, by having built and designed its products and services, for example the HoloLens 1 and HoloLens 2, to automatically perform the claimed system limitations). Defendant conditions participation in activities, as well as the receipt of benefits, upon performance of any such step by any such third party or end-user. Defendant exercises control over its systems and benefits from others' use of its systems, including without limitation creating and receiving ongoing revenue streams from the accused system, and improvement/enhancement of its systems. End-users and third parties receive a benefit from fiscal gains (*e.g.*, third-party resellers; partners increasing the value of their own system and services) and through virtual reality/augmented reality ("VR/AR") capabilities (which have both recreational and professional benefits across a broad spectrum of applications (*e.g.*, medical care, military operations, construction, industry, education, science, gaming, etc.)). In fact, VR/AR capabilities form the basis of entire businesses, such as some businesses held by Microsoft partners. All third-party and end-user involvement with the accused systems, if any, is incidental, ancillary, or contractual.

53. ***In the alternative,*** if the end-user or third-party is deemed to put the invention into service and controls the system as a whole, the end-user and third-party benefit from each element of the claims because Defendant's system (*e.g.*, HoloLens 1 and HoloLens 2) are designed and built by Defendant to perform the claimed steps automatically. End-users receive a benefit from putting the invention into service, thereby accessing VR/AR capabilities as discussed *supra*. Third parties (*e.g.*, Microsoft

partners, resellers, developers, etc.) receive a benefit from putting the invention into service by improving their own systems and profits. Further, and on information and belief, third-party partners and developers share a fiscally/contractually beneficial relationship with Microsoft. In both cases, Microsoft would be liable as an inducing infringer as described *infra*.

54. Thus, to the extent that any step of the asserted system claims is performed by someone other than Defendant (*e.g.*, an end-user or third party), Defendant nonetheless directly infringes the '771 patent at least by one or more of: (1) providing products and services (*e.g.*, HoloLens 1 and HoloLens 2) built and designed to perform system functionalities covered by the asserted system claims; (2) dictating via software and associated directions and instructions (*e.g.*, to end-users) the use of the accused products such that, when used as built and designed by Defendant, such products perform the claimed systems; (3) marketing and advertising the accused products, and otherwise instructing and directing the use of the accused products in ways covered by the asserted method claims; and (4) updating and providing ongoing support and maintenance for the accused products.

Induced Infringement

55. Defendant has induced and will continue to induce others' infringement of the '771 patent, including, but not limited to, claims 1-21 of the '771 patent, in violation of 35 U.S.C. § 271(b). At least no later than October 5, 2016, based on correspondence with Microsoft, and certainly no later than August 28, 2017, based on

Dr. David Douglas's in person discussions with Microsoft HoloLens personnel, Defendant has actively encouraged infringement of the '771 patent, knowing that the acts it induced constituted infringement of the '771 patent, and its encouraging acts actually resulted in direct patent infringement by others.

56. On information and belief, Defendant has and continues to promote, advertise, and support end-users (*e.g.,* customers, etc.) and third parties (*e.g.*, Microsoft partners, resellers, developers, etc.) of its HoloLens 1 and HoloLens 2 products, with actions to include, but not limited to the following:

a. Defendant advertises Microsoft's HoloLens products on its website, *e.g.*, https://www.microsoft.com/en-us/hololens/buy (last visited April 5, 2021);

b. Defendant provides end-user and third-party solutions and support – documentation, instructions, Q&As, Code Samples, etc. – on its website, *e.g.*, https://www.microsoft.com/en-us/hololens/apps (business and tech solutions) (last visited April 5, 2021), https://docs.microsoft.com/en-us/hololens/ (how-to support documentation, instructions, code samples, etc.) (last visited April 5, 2021), and https://developer.microsoft.com/en-us/mixed-reality/ (developer support and documentation) (last visited April 5, 2021);

c. Defendant provides an extensive partner and reseller program for selling, supporting, and using its HoloLens technologies, *e.g.*,

https://www.microsoft.com/en-us/hololens/mixed-reality-partners (last visited April 5, 2021), and actively advertise for new partners to join, https://www.microsoft.com/en-us/hololens/mrpp (last visited April 5, 2021);

d. Defendant provides a developer program for outside tech developers to build and manage applications and solutions with its HoloLens technologies, *e.g.*, https://www.microsoft.com/en-us/hololens/developers (last visited April 5, 2021) and https://mixedreality.microsoftcrmportals.com/en-US/signup/ (last visited April 5, 2021).

Defendant controls the distribution and use of its HoloLens technologies – and further controls requirements for partners and developers. On information and belief, Defendant continues to engage in these acts with knowledge of the '771 patent at least no later than October 5, 2016 and certainly not later than August 28, 2017 per Dr. David Douglas's discussion with Microsoft HoloLens personnel, with the actual intent to cause the acts which it knew or should have known would induce actual infringement. Microsoft continues marketing the accused products despite receiving notice of the '771 patent and its purported infringement at least no later than August 28, 2017.

57. As described in paragraphs 27-32, which are incorporated here by reference, Microsoft knew or should have known it was infringing the '771 patent, and

thereby knew or should have known it was inducing others to infringe.[3] To this end, Microsoft knew or should have known it was infringing the '771 patent no later than August 28, 2017, at which point Dr. David Douglas provided Microsoft HoloLens personnel detailed information on the '771 patent. While wearing the HoloLens device, Dr. David Douglas explained to Microsoft HoloLens personnel that the HoloLens performed certain of D3D's patented features, including, *inter alia*:

a. a filtering process as patented by D3D;

b. generating volumes by arranging slices as patented by D3D;

c. stereoscopic 3D imaging as patented by D3D; and

d. zooming in with convergence point shifting as patented by D3D.

Through Dr. David Douglas's clear statements, and in context of the entire August 28, 2017 conversation (including discussions on D3D's technology, patents, and related articles), Microsoft knew or should have known it was infringing the '771 patent, or otherwise exercised willful blindness.

58. To the extent Defendant does not specify and control relevant VR/AR capabilities of the accused products and services in the claimed manner (which it does), Defendant – with full knowledge of the '771 patent – actively encourages others (*e.g.*, end-users and third parties) – to use the accused products and services as claimed. Such active encouragement by Defendant takes many forms, such as those examples

[3] Microsoft has already conceded it knew about the '771, '183, '766, and '691 patents. *See* Doc. No. 59 at 8 ("[W]hich is not disputed by Microsoft…").

provided *supra*, and includes promotion and instructional materials, as well as technical specifications and requirements, and ongoing technical assistance.

59. On information and belief, Defendant engaged in these acts with the actual intent to cause the acts which it knew or should have known would induce actual infringement, or otherwise exercised willful blindness of a high probability that it has induced infringement.

Contributory Infringement

60. Defendant has contributed and will continue to contribute to others' infringement of the '771 patent, including, but not limited to, claims 1-21 of the '771 patent, in violation of 35 U.S.C. § 271(c). Defendant has offered to sell and sold within the United States, or imported into the United States, at least some of the components of the claimed methods (claims 1-7), mediums (claims 8-14), and systems (claims 15-21) constituting a material part of the patented methods, mediums, and systems, knowing the same to be especially made or especially adapted for use in infringing the '771 patent, and not a staple article or commodity of commerce for substantial non-infringing use.

61. As discussed *supra*, Defendant had actual and constructive knowledge of the '771 patent, as well as actual and constructive knowledge of the relevance and significance of the '771 patent to its research, development, production, and sales at least no later than October 5, 2016 (per D3D direct correspondence), and certainly not

later than August 28, 2017 per Dr. David Douglas's in person discussion with Microsoft HoloLens personnel.

62. As described in paragraphs 27-32 and 57, which are incorporated here by reference, Microsoft knew or should have known it was infringing the '771 patent no later than August 28, 2017, and thereby knew or should have known it was contributing to others' infringement.

63. To the extent Defendant does not specify and control relevant VR/AR capabilities of the accused products and services in the claimed manner (which it does), Defendant – with full knowledge of the '771 patent – supplies the accused products to others (*e.g.*, end-users and third parties) to perform the claimed method, medium, and system steps. The accused products and services embody the VR/AR capabilities of the '771 patent, in a manner that constitutes a material part of the claimed inventions, if not the entire claimed inventions. Defendant dictates and controls the componentry, techniques, and uses of the accused products and services, with full knowledge of the '771 patent, and know the same to be especially made and especially adapted for the infringement of the '771 patent.

64. On information and belief, the relevant portions of Defendant's products and services (*e.g.*, HoloLens 1 and HoloLens 2), which Microsoft made, marketed, used, sold, offered to sell, or imported, are not staple articles or commodities of commerce suitable for substantial non-infringing use.

Willful Infringement

65. As discussed *supra* and specifically in Paragraphs 27-32, which are incorporated herein by reference, Defendant had actual and constructive knowledge of the '771 patent, as well as actual and constructive knowledge of the relevance and significance of the '771 patent to its research, development, production, and sales at least no later than October 5, 2016 (per D3D direct correspondence), and certainly not later than August 28, 2017 per Dr. David Douglas's in person discussion with Microsoft HoloLens personnel.

66. Defendant therefore had continuing actual and constructive knowledge of D3D's patent portfolio, more specifically the '771 patent (parent to all other asserted patents), and the relevance and significance of D3D's patented technology.

67. Defendant's infringement, as demonstrated *supra*, is egregious, and combined with Defendant's clear knowledge, has been willful. Plaintiff respectfully requests that the Court award enhanced damages based on Defendant's conduct.

Damage to D3D Technologies Inc.

68. On information and belief, Defendant's actions have and will continue to constitute direct and indirect (induced and contributory) infringement of at least claims 1-21 of the '771 patent in violation of 35 U.S.C. §271.

69. As a result of Defendant's infringement of at least claims 1-21 of the '771 patent, D3D has suffered monetary damages in an amount yet to be determined, in no

event less than a reasonable royalty, and will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

70. Defendant's wrongful acts have damaged and will continue to damage D3D irreparably, and Plaintiff has no adequate remedy at law for those wrongs and injuries. In addition to its actual damages, Plaintiff D3D is entitled to a permanent injunction restraining and enjoining Defendant and its respective agents, servants, and employees, and all person acting thereunder, in concert with, or on its behalf, from infringing at least claims 1-21 of the '771 patent.

COUNT II
INFRINGEMENT OF THE '183 PATENT

71. Plaintiff D3D repeats and realleges Paragraphs 1 through 32 and 39, which are incorporated by reference as if fully restated herein.

72. Plaintiff D3D is the owner by assignment of all right, title, and interest in and to the '183 patent, including the right to recover for any and all infringement thereof.

73. Defendant is not licensed or otherwise authorized to practice the '183 patent.

74. Plaintiff D3D has not licensed or otherwise authorized Defendant under the '183 patent.

75. The '183 patent is valid and enforceable, and presumed valid under 35 U.S.C. § 282.

76. The '183 patent relates to, among other things, methods, apparatus, and computer program product for three-dimensional viewing and manipulation of images.

77. On information and belief, Defendant has infringed the '183 patent by making, having made, using, importing, providing, supplying, distributing, testing, selling, or offering for sale a method, apparatus, and computer program product for three-dimensional viewing and manipulation of images, as described and claimed in the '183 patent. For example, Microsoft's HoloLens 1 and HoloLens 2, described in Paragraph 39 *supra*, infringe the '183 patent.

78. On information and belief, Defendant continues to engage in infringing acts, as described *supra*, with knowledge of the '183 patent at least no later than October 5, 2016 per D3D correspondence with Microsoft officers as described in Paragraphs 27-32, and certainly not later than August 28, 2017 per Dr. David Douglas's in person discussion with Microsoft HoloLens personnel, and with the actual intent to cause the acts which it knew or should have known would directly infringe, individually or jointly, and induce actual infringement.

Defendant's Direct Infringement of the '183 Patent:

79. On information and belief, in violation of 35 U.S.C. § 271(a), Defendant has directly infringed, continues to directly infringe, and will continue to directly infringe, individually or jointly, absent this Court's intervention one or more claims of the '183 patent, including for example at least claims 1-18 of the '183 patent, either

literally or under the doctrine of equivalents, by making, distributing, using, testing, selling, and/or offering to sell within the United States, or importing into the United States, without license or authority, Defendant's suite of virtual reality and augmented reality products, including, but not limited to, the HoloLens 1 and HoloLens 2.

Direct Infringement Allegations

80. ***Direct Infringement Claim Charts***: **Exhibit 6** illustrates how Microsoft's HoloLens 1 and HoloLens 2 systems infringe the claimed methods, computer readable mediums, and computer systems – with the computer system claims being used as representative of all the claims. Such supplied evidence is illustrative, and not exhaustive. Further, a person of ordinary skill in the art would readily recognize the broader implications of these representative materials.

81. On information and belief, as demonstrated in **Exhibit 6** (claim 13 is representative), and by way of example only, Defendant Microsoft performs each limitation of claim 1 of the '183 patent:

> "1. A method of three-dimensional viewing of images by a user comprising:
> selecting a volume of interest from a collection of image slices;
> arranging said slices corresponding to said volume of interest;
> selecting an initial viewing angle of said slices;
> selecting a viewpoint for a left eye;
> selecting a viewpoint for a right eye;
> displaying, in a display unit (DU), an image for said left eye based on said initial viewing angle, said view point for said left eye and said volume of interest;
> displaying, in said DU, an image for said right eye based on said initial viewing angle, said view point for said right eye, and said volume of interest and wherein said image for said left eye and said image for said right eye produce a three-dimensional image to said user;

wherein a convergence point of said image for said left eye and said image for said right eye is shifted to provide a different perspective of the volume of interest to said user; and

selecting an alternate viewing angle, said selecting an alternate viewing angle comprising:

reorienting said volume of interest in accordance with said alternate viewing angle;

displaying, in said DU, an image for said left eye based on said alternate viewing angle, said view point for said left eye and said volume of interest; and

displaying, in said DU, an image for said right eye based on said alternate viewing angle, said view point for said right eye, and said volume of interest and wherein said image for said left eye and said image for said right eye produce an alternate three-dimensional image to said user."

82. On information and belief, as demonstrated in **Exhibit 6** (claim 13 is representative), and by way of example only, Defendant Microsoft performs each limitation of claim 7 of the '183 patent:

"7. A non-transitory computer readable medium having computer readable code thereon for three-dimensional viewing of images by a user, the medium comprising:

instructions for selecting a volume of interest from a collection of image slices;

instructions for arranging said slices corresponding to said volume of interest;

instructions for selecting an initial viewing angle of said slices;

instructions for selecting a viewpoint for a left eye;

instructions for selecting a viewpoint for a right eye;

instructions for displaying, in a display unit (DU), an image for said left eye based on said initial viewing angle, said view point for said left eye and said volume of interest;

instructions for displaying, in said DU, an image for said right eye based on said initial viewing angle, said view point for said right eye, and said volume of interest and wherein said image for said left eye and said image for said right eye produce a three-dimensional image to said user;

wherein a convergence point of said image for said left eye and said image for said right eye is shifted to provide a different perspective of the volume of interest to said user; and

selecting an alternate viewing angle, said selecting an alternate viewing angle comprising:

reorienting said volume of interest in accordance with said alternate viewing angle;

displaying, in said DU, an image for said left eye based on said alternate viewing angle, said view point for said left eye and said volume of interest; and

displaying, in said DU, an image for said right eye based on said alternate viewing angle, said view point for said right eye, and said volume of interest and wherein said image for said left eye and said image for said right eye produce an alternate three-dimensional image to said user."

83. On information and belief, as demonstrated in **Exhibit 6**, and by way of example only, Defendant Microsoft performs each limitation of claim 13 of the '183 patent:

"13. A computer system comprising:

a memory;

a processor;

a communications interface;

an interconnection mechanism coupling the memory, the processor and the communications interface; and

wherein the memory is encoded with an application providing three-dimensional viewing of images by a user, that when performed on the processor, provides a process for processing information, the process causing the computer system to perform the operations of:

selecting a volume of interest from a collection of image slices;

arranging said slices corresponding to said volume of interest;

selecting an initial viewing angle of said slices;

selecting a viewpoint for a left eye;

selecting a viewpoint for a right eye;

displaying, in a display unit (DU), an image for said left eye based on said initial viewing angle, said view point for said left eye and said volume of interest;

displaying, in said DU, an image for said right eye based on said initial viewing angle, said view point for said right eye, and said volume of interest and wherein said image for said left eye and said image for said right eye produce a three-dimensional image to said user;

wherein a convergence point of said image for said left eye and said image for said right eye is shifted to provide a different perspective of the volume of interest to said user; and

selecting an alternate viewing angle, said selecting an alternate viewing angle comprising:

reorienting said volume of interest in accordance with said alternate viewing angle;

displaying, in said DU, an image for said left eye based on said alternate viewing angle, said view point for said left eye and said volume of interest; and

displaying, in said DU, an image for said right eye based on said alternate viewing angle, said view point for said right eye, and said volume of interest and wherein said image for said left eye and said image for said right eye produce an alternate three-dimensional image to said user."

84. On information and belief, Defendant Microsoft's accused systems (*e.g.*, HoloLens 1 and HoloLens 2) embody each limitation of the dependent claims 2-6, 8-12, and 14-18 of the '183 patent. Evidence of such infringement is provided in **Exhibit 6** (dependent claims 14-18 are representative). Reasonable discovery will confirm this infringement.

Defendant's Direct Infringement of the Method Claims

85. Defendant performs the methods recited in claims 1-6 of the '183 patent. Infringement of a method claim requires performing every step of the claimed method. Defendant performs every step of the methods recited in claims 1-6. As set forth *supra*, Defendant performs, for example, the method recited in claim 1, *i.e.*, "1. A method of three-dimensional viewing of images by a user comprising: selecting a volume of interest from a collection of image slices; arranging said slices corresponding to said volume of interest; selecting an initial viewing angle of said slices; selecting a viewpoint for a left eye; selecting a viewpoint for a right eye; displaying, in a display unit (DU), an image for said left eye based on said initial viewing angle, said view point

for said left eye and said volume of interest; displaying, in said DU, an image for said right eye based on said initial viewing angle, said view point for said right eye, and said volume of interest and wherein said image for said left eye and said image for said right eye produce a three-dimensional image to said user; wherein a convergence point of said image for said left eye and said image for said right eye is shifted to provide a different perspective of the volume of interest to said user; and selecting an alternate viewing angle, said selecting an alternate viewing angle comprising: reorienting said volume of interest in accordance with said alternate viewing angle; displaying, in said DU, an image for said left eye based on said alternate viewing angle, said view point for said left eye and said volume of interest; and displaying, in said DU, an image for said right eye based on said alternate viewing angle, said view point for said right eye, and said volume of interest and wherein said image for said left eye and said image for said right eye produce an alternate three-dimensional image to said user."

86. Even if one or more steps recited in method claims 1-6 are performed through technologies (*e.g.*, HoloLens 1 and HoloLens 2) not in the physical possession of the Defendant (*e.g.*, in the possession of Microsoft partners, resellers, developers, end-users, etc.), the claimed methods are specifically performed by Microsoft's HoloLens technology. Defendant directly infringes as its VR/AR technology dictate the performances of the claimed steps, such as the "selecting a volume," "arranging," "selecting an initial," "selecting . . . for a left eye," "selecting . . . for a right eye," "displaying . . . for said left eye," "displaying . . . for said right eye," "convergence

point . . . is shifted," "selecting an alternate," "reorienting," "displaying . . . for said left eye," and "displaying . . . for said right eye" steps recited in claim 1 of the '183 patent. On information and belief, Defendant's products and services are designed and built by Defendant to perform the claimed steps automatically. On information and belief, only Defendant can modify the functionality relating to these activities; no one else can modify such functionality. Defendant therefore performs all the claimed steps and directly infringes the asserted method claims of the '183 patent, as demonstrated in **Exhibit 6** (claim 13 is representative).

87. ***Additionally or alternatively***, to the extent third parties or end-users perform one or more steps of the methods recited in claims 1-6 of the '183 patent, any such action by third parties or end-users is attributable to Defendant, such that Defendant is liable for directly infringing such claims in a multiple actor or joint infringement situation, because Defendant directs or controls the other actor(s). In this regard, Defendant conditions participation in activities, as well as the receipt of benefits, upon performance of any such step by any such third party or end-user. Defendant retains control over how the accused methods are performed (*e.g.*, by having built and designed its products and services, for example the HoloLens 1 and HoloLens 2 to automatically perform the claimed method limitations). Defendant exercises control over the methods performed by *e.g.*, the HoloLens 1 and HoloLens 2, and benefits from others' use, including without limitation creating and receiving ongoing revenue streams from the accused products and related goods, and

improvement/enhancement of its products and related goods. End-users and third parties receive a benefit from fiscal gains (*e.g.*, third-party resellers; partners increasing the value of their own products and services) and through VR/AR capabilities (which have both recreational and professional benefits across a broad spectrum of applications (*e.g.*, medical care, military operations, construction, industry, education, science, gaming, etc.)). In fact, VR/AR capabilities form the basis of entire businesses, such as some businesses held by Microsoft partners – over whom Microsoft exercises additional control with requirements for partnership (and for developers). All third-party and end-user involvement with the accused methods, if any, is incidental, ancillary, or contractual.

88. Thus, to the extent that any step of the asserted method claims is performed by someone other than Defendant (*e.g.*, an end-user or third party), Defendant nonetheless directly infringes the '183 patent at least by one or more of: (1) providing products and services (*e.g.*, HoloLens 1 and HoloLens 2) built and designed to perform methods covered by the asserted method claims; (2) dictating via software and associated directions and instructions (*e.g.*, to end-users) the use of the accused products such that, when used as built and designed by Defendant, such products perform the claimed methods; (3) having the ability to terminate others' access to and use of the accused products and related goods and services if the accused products are not used in accordance with Defendant's required terms (*e.g.*, revocation of partnership or developer agreement); (4) marketing and advertising the accused products, and

otherwise instructing and directing the use of the accused products in ways covered by the asserted method claims; and (5) updating and providing ongoing support and maintenance for the accused products.

Defendant's Direct Infringement of the Computer Readable Medium and Computer System Claims

89. Defendant makes, uses, sells, offers to sell, and/or imports the computer readable mediums recited in claims 7-12 and the computer systems recited in claims 13-18. Such claims are infringed when an accused medium and/or accused system, having every element of the claimed medium and/or claimed system, is made, used, sold, offered for sale, or imported within the United States. Defendant makes, uses, sells, offers to sell, and/or imports the accused products (or cause such acts to be performed on its behalf), which possess every element recited in claims 7-12 and claims 13-18, as set forth in more detail *supra* and demonstrated in **Exhibit 6** attached (claims 13-18 are representative). Defendant therefore directly infringes the system claims of the '183 patent.

90. ***Additionally or alternatively,*** regarding any "use" of the accused systems "by customers," which is a subset of the direct infringement of system claims, Defendant directly infringes in such situations, as Defendant puts the accused systems into service and, at the same time, controls the system as a whole and obtains benefit from it. Defendant provides all components in the system and controls all aspects of its functionality. Although third parties (*e.g.*, Microsoft partners, resellers, developers, etc.) and end-users (*e.g.*, customers.) may have physical control over certain aspects of

the accused systems, Defendant retains control over how the accused system operates (*e.g.*, by having built and designed its products and services, for example the HoloLens 1 and HoloLens 2, to automatically perform the claimed system limitations). Defendant conditions participation in activities, as well as the receipt of benefits, upon performance of any such step by any such third party or end-user. Defendant exercises control over its systems and benefit from others' use of its systems, including without limitation creating and receiving ongoing revenue streams from the accused system, and improvement/enhancement of its systems. End-users and third parties receive a benefit from fiscal gains (*e.g.*, third-party resellers; partners increasing the value of their own system and services) and through VR/AR capabilities (which have both recreational and professional benefits across a broad spectrum of applications (*e.g.*, medical care, construction, education, science, gaming, etc.)). In fact, VR/AR capabilities form the basis of entire businesses, such as some businesses held by Microsoft partners. All third-party and end-user involvement with the accused systems, if any, is incidental, ancillary, or contractual.

91. ***In the alternative,*** if the end-user or third-party is deemed to put the invention into service and controls the system as a whole, the end-user and third-party benefit from each element of the claims because Defendant's system (*e.g.*, HoloLens 1 and HoloLens 2) are designed and built by Defendant to perform the claimed steps automatically. End-users receive a benefit from putting the invention into service, thereby accessing VR/AR capabilities as discussed *supra*. Third parties (*e.g.*, Microsoft

partners, resellers, developers etc.) receive a benefit from putting the invention into service by improving their own systems and profits. Further, and on information and belief, third-party partners and developers share a fiscally/contractually beneficial relationship with Microsoft. In both cases, Microsoft would be liable as an inducing infringer as described *infra*.

92. Thus, to the extent that any step of the asserted system claims is performed by someone other than Defendant (*e.g.*, an end-user or third party), Defendant nonetheless directly infringes the '183 patent at least by one or more of: (1) providing products and services (*e.g.*, HoloLens 1 and HoloLens 2) built and designed to perform system functionalities covered by the asserted system claims; (2) dictating via software and associated directions and instructions (*e.g.*, to end-users) the use of the accused products such that, when used as built and designed by Defendant, such products perform the claimed systems; (3) marketing and advertising the accused products, and otherwise instructing and directing the use of the accused products in ways covered by the asserted method claims; and (4) updating and providing ongoing support and maintenance for the accused products.

Induced Infringement

93. Defendant has induced and will continue to induce others' infringement of the '183 patent, including but not limited to, claims 1-18 of the '183 patent, in violation of 35 U.S.C. § 271(b). At least no later than October 5, 2016 and certainly no later than the August 28, 2017, based on Dr. David Douglas's in person discussions

with Microsoft HoloLens personnel, Defendant has actively encouraged infringement of the '183 patent, knowing that the acts it induced constituted infringement of the '183 patent, and its encouraging acts actually resulted in direct patent infringement by others.

94. On information and belief, Defendant has and continues to promote, advertise, and support end-users (*e.g.,* customers, etc.) and third parties (*e.g.*, Microsoft partners, resellers, developers, etc.) of its HoloLens 1 and HoloLens 2 products, with actions to include, but not limited to the following:

a. Defendant advertises Microsoft's HoloLens products on its website, *e.g.*, https://www.microsoft.com/en-us/hololens/buy (last visited April 5, 2021);

b. Defendant provides end-user and third-party solutions and support – documentation, instructions, Q&As, Code Samples, etc. – on its website, *e.g.*, https://www.microsoft.com/en-us/hololens/apps (business and tech solutions) (last visited April 5, 2021), https://docs.microsoft.com/en-us/hololens/ (how-to support documentation, instructions, code samples, etc.) (last visited April 5, 2021), and https://developer.microsoft.com/en-us/mixed-reality/ (developer support and documentation) (last visited April 5, 2021);

c. Defendant provides an extensive partner and reseller program for selling, supporting, and using its HoloLens technologies, *e.g.*,

https://www.microsoft.com/en-us/hololens/mixed-reality-partners (last visited April 5, 2021), and actively advertise for new partners to join, https://www.microsoft.com/en-us/hololens/mrpp (last visited April 5, 2021);

d. Defendant provides a developer program for outside tech developers to build and manage applications and solutions with its HoloLens technologies, *e.g.*, https://www.microsoft.com/en-us/hololens/developers (last visited April 5, 2021) and https://mixedreality.microsoftcrmportals.com/en-US/signup/ (last visited April 5, 2021).

Defendant controls the distribution and use of its HoloLens technologies – and further controls requirements for partners and developers. On information and belief, Defendant continues to engage in these acts with knowledge of the '183 patent at least no later than October 5, 2016, and certainly not later than August 28, 2017 per Dr. David Douglas's discussion with Microsoft HoloLens personnel, with the actual intent to cause the acts which it knew or should have known would induce actual infringement. Microsoft continues marketing the accused products despite receiving notice of the '183 patent and its purported infringement at least no later than August 28, 2017.

95. As described in paragraphs 27-32, which are incorporated here by reference, Microsoft knew or should have known it was infringing the '183 patent, and

thereby knew or should have known it was inducing others to infringe. To this end, Microsoft knew or should have known it was infringing the '183 patent no later than August 28, 2017, at which point Dr. David Douglas provided Microsoft HoloLens personnel detailed information on the '183 patent. While wearing the HoloLens device, Dr. David Douglas explained to Microsoft HoloLens personnel that the HoloLens performed certain of D3D's patented features, including, *inter alia*:

a. a filtering process as patented by D3D;

b. generating volumes by arranging slices as patented by D3D;

c. stereoscopic 3D imaging as patented by D3D; and

d. zooming in with convergence point shifting as patented by D3D.

Through Dr. David Douglas's clear statements, and in the context of the entire August 28, 2017 conversation (including discussions on D3D's technology, patents, and related articles), Microsoft knew or should have known it was infringing the '183 patent, or otherwise exercised willful blindness.

96. To the extent Defendant does not specify and control relevant VR/AR capabilities of the accused products and services in the claimed manner (which it does), Defendant – with full knowledge of the '183 patent – actively encourages others (*e.g.*, end-users and third parties) – to use the accused products and services as claimed. Such active encouragement by Defendant takes many forms, such as those examples provided *supra*, and includes promotion and instructional materials, as well as technical specifications and requirements, and ongoing technical assistance.

97. On information and belief, Defendant engaged in these acts with the actual intent to cause the acts which it knew or should have known would induce actual infringement, or otherwise exercised willful blindness of a high probability that it has induced infringement.

Contributory Infringement

98. Defendant has contributed and will continue to contribute to others' infringement of the '183 patent, including but not limited to, claims 1-18 of the '183 patent, in violation of 35 U.S.C. § 271(c). Defendant has offered to sell and sold within the United States, or imported into the United States, at least some of the components of the claimed methods (claims 1-6), mediums (claims 7-12), and systems (claims 13-18) constituting a material part of the patented methods, mediums, and systems, knowing the same to be especially made or especially adapted for use in infringing the '183 patent, and not a staple article or commodity of commerce for substantial non-infringing use.

99. As discussed *supra*, Defendant had actual and constructive knowledge of the '183 patent, as well as actual and constructive knowledge of the relevance and significance of the '183 patent to its research, development, production, and sales at least no later than October 5, 2116 (per D3D direct correspondence), and certainly not later than August 28, 2017 per Dr. David Douglas's in person discussion with Microsoft HoloLens personnel.

100. As described in paragraphs 27-32 and 95, which are incorporated here by reference, Microsoft knew or should have known it was infringing the '183 patent no later than August 28, 2017, and thereby knew or should have known it was contributing to others' infringement.

101. To the extent Defendant does not specify and control relevant VR/AR capabilities of the accused products and services in the claimed manner (which it does), Defendant – with full knowledge of the '183 patent – supplies the accused products to others (*e.g.*, end-users and third parties) to perform the claimed method, medium, and system steps. The accused products and services embody the VR/AR capabilities of the '183 patent, in a manner that constitutes a material part of the claimed inventions if not the entire claimed inventions. Defendant dictates and controls the componentry, techniques, and uses of the accused products and services, with full knowledge of the '183 patent, and know the same to be especially made and especially adapted for the infringement of the '183 patent.

102. On information and belief, the relevant portions of Defendant's products and services (*e.g.*, HoloLens 1 and HoloLens 2 technologies), which Microsoft made, marketed, used, sold, offered to sell, or imported, are not stable articles or commodities of commerce suitable for substantial non-infringing use.

Willful Infringement

103. As discussed *supra* and specifically in Paragraphs 27-32, which are incorporated herein by reference, Defendant had actual and constructive knowledge

of the '183 patent, as well as actual and constructive knowledge of the relevance and significance of the '183 patent to its research, development, production, and sales at least no later than October 5, 2016 (per D3D direct correspondence), and certainly not later than August 28, 2017 per Dr. David Douglas's in person discussion with Microsoft HoloLens personnel.

104. Defendant therefore had continuing actual and constructive knowledge of D3D's patent portfolio, most specifically the '183 patent, and the relevance and significance of D3D's patented technology.

105. Defendant's infringement, as demonstrated *supra*, is egregious, and combined with Defendant's clear knowledge, has been willful. Plaintiff respectfully requests that the Court award enhanced damages based on Defendant's conduct.

Damage to D3D Technologies Inc.

106. On information and belief, Defendant's actions have and will continue to constitute direct and indirect (induced and contributory) infringement of at least claims 1-18 of the '183 patent in violation of 35 U.S.C. §271.

107. As a result of Defendant's infringement of at least claims 1-18 of the '183 patent, D3D has suffered monetary damages in an amount yet to be determined, in no event less than a reasonable royalty, and will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

108. Defendant's wrongful acts have damaged and will continue to damage D3D irreparably, and Plaintiff has no adequate remedy at law for those wrongs and

injuries. In addition to its actual damages, Plaintiff D3D is entitled to a permanent injunction restraining and enjoining Defendant and its respective agents, servants, and employees, and all person acting thereunder, in concert with, or on its behalf, from infringing at least claims 1-18 of the '183 patent.

COUNT III
INFRINGEMENT OF THE '766 PATENT

109. Plaintiff D3D repeats and realleges Paragraphs 1 through 32 and 39, which are incorporated by reference as if fully restated herein.

110. Plaintiff D3D is the owner by assignment of all right, title, and interest in and to the '766 patent, including the right to recover for any and all infringement thereof.

111. Defendant is not licensed or otherwise authorized to practice the '766 patent.

112. Plaintiff D3D has not licensed or otherwise authorized Defendant under the '766 patent.

113. The '766 patent is valid and enforceable, and presumed valid under 35 U.S.C. § 282.

114. The '766 patent relates to, among other things, methods, apparatus, and computer program product for three-dimensional viewing and manipulation of images.

115. On information and belief, Defendant has infringed the '766 patent by making, having made, using, importing, providing, supplying, distributing, testing,

selling, or offering for sale a method, apparatus, and computer program product for three-dimensional viewing and manipulation of images, as described and claimed in the '766 patent. For example, Microsoft's HoloLens 2, described in Paragraphs 39 *supra* infringes the '766 patent.

116. On information and belief, Defendant continues to engage in infringing acts, as described *supra*, with knowledge of the '766 patent at least no later August 28, 2017 per Dr. David Douglas's in person conversation with Microsoft personnel as described in Paragraph 27-32, and certainly not later than May 7, 2019 per D3D correspondence with Microsoft officers, and with the actual intent to cause the acts which it knew or should have known would directly infringe, individually or jointly, and induce actual infringement.

Defendant's Direct Infringement of the '766 Patent:

117. On information and belief, in violation of 35 U.S.C. § 271(a), Defendant has directly infringed, continues to directly infringe, and will continue to directly infringe, individually or jointly, absent this Court's intervention one or more claims of the '766 patent, including for example at least claims 1, 3, 5-7, 9, 11-13, and 16-18 of the '766 patent, either literally or under the doctrine of equivalents, by making, distributing, using, testing, selling, and/or offering to sell within the United States, or importing into the United States, without license or authority, Defendant's suite of virtual reality and augmented reality products, including, but not limited to, the HoloLens 2.

Direct Infringement Allegations

118. ***Direct Infringement Claim Charts***: **Exhibit 7** illustrates how Microsoft's HoloLens 2 systems infringe the claimed methods, computer readable mediums, and computer systems – with the computer system claims being used as representative of all the claims. Such supplied evidence is illustrative, and not exhaustive. Further, a person of ordinary skill in the art would readily recognize the broader implications of these representative materials.

119. On information and belief, as demonstrated in **Exhibit 7** (claim 13 is representative), and by way of example only, Defendant Microsoft performs each limitation of claim 1 of the '766 patent:

> "1. A method of three-dimensional viewing of images by a user comprising:
>
> passing left eye viewing point (LEVP) imagery through a left eye filter having a first orientation to obtain a filtered LEVP imagery;
>
> passing right eye viewing point (REVP) imagery through a right eye filter having a second orientation, said second orientation different than said first orientation to obtain a filtered REVP imagery, wherein said different orientation of said right eye filter with said left eye filter comprises one of the group consisting of:
>
> said left eye filter is ninety degrees apart from said right eye filter when said left eye filter and said right eye filter are linear polarization filters;
>
> said left eye filter is an opposite handedness with respect to said right eye filter when said left eye filter and said right eye filter are circular polarization filters; and
>
> said left eye filter is a chromatically opposite color than said right eye filter when said left eye filter and said right eye filter are anaglyph color filters;
>
> projecting said filtered LEVP imagery on a display;
>
> projecting said filtered REVP imagery on said display wherein said filtered REVP imagery is superimposed over said filtered LEVP imagery; and

wherein a user wearing polarized glasses is able to view said filtered LEVP imagery and said filtered REVP imagery as three dimensional imagery on said display, wherein a left lens of said polarized glasses is oriented in a similar manner as said left eye filter and wherein a right lens of said polarized glasses is oriented in a similar manner as said right eye filter."

120. On information and belief, as demonstrated in **Exhibit 7** (claim 13 is representative), and by way of example only, Defendant Microsoft performs each limitation of claim 7 of the '766 patent:

"7. A non-transitory computer readable storage medium having computer readable code thereon for three dimensional viewing of images, the medium including instructions in which a computer system performs operations comprising:

passing left eye viewing point (LEVP) imagery through a left eye filter having a first orientation to obtain a filtered LEVP imagery;

passing right eye viewing point (REVP) imagery through a right eye filter having a second orientation, said second orientation different than said first orientation to obtain a filtered REVP imagery, wherein said different orientation of said right eye filter with said left eye filter comprises one of the group consisting of:

said left eye filter is ninety degrees apart from said right eye filter when said left eye filter and said right eye filter are linear polarization filters;

said left eye filter is an opposite handedness with respect to said right eye filter when said left eye filter and said right eye filter are circular polarization filters; and

said left eye filter is a chromatically opposite color than said right eye filter when said left eye filter and said right eye filter are anaglyph color filters;

projecting said filtered LEVP imagery on a display;

projecting said filtered REVP imagery on said display wherein said filtered REVP imager is superimposed over said filtered LEVP imagery; and

wherein a user wearing polarized glasses is able to view said filtered LEVP imagery and said filtered REVP imagery as three dimensional imagery on said display, wherein a left lens of said polarized glasses is oriented in a similar manner as said left eye filter and wherein

a right lens of said polarized glasses is oriented in a similar manner as said right eye filter."

121. On information and belief, as demonstrated in **Exhibit 7**, and by way of example only, Defendant Microsoft performs each limitation of claim 13 of the '766 patent:

"13. A computer system comprising:
a memory;
a processor;
a communications interface;
an interconnection mechanism coupling the memory, the processor and the communications interface; and
wherein the memory is encoded with an application providing three dimensional viewing of images, that when performed on the processor, provides a process for processing information, the process causing the computer system to perform the operations of:
passing left eye viewing point (LEVP) imagery through a left eye filter having a first orientation to obtain a filtered LEVP imagery;
passing right eye viewing point (REVP) imagery through a right eye filter having a second orientation, said second orientation different than said first orientation to obtain a filtered REVP imagery wherein said different orientation of said right eye filter with said left eye filter comprises one of the group consisting of:
said left eye filter is ninety degrees apart from said right eye filter when said left eye filter and said right eye filter are linear polarization filters;
said left eye filter is an opposite handedness with respect to said right eye filter when said left eye filter and said right eye filter are circular polarization filters; and
said left eye filter is a chromatically opposite color than said right eye filter when said left eye filter and said right eye filter are anaglyph color filters;
projecting said filtered LEVP imagery on a display;
projecting said filtered REVP imagery on said display wherein said filtered REVP imagery is superimposed over said filtered LEVP imagery; and
wherein a user wearing polarized glasses is able to view said filtered LEVP imagery and said filtered REVP imagery as three dimensional imagery on said display, wherein a left lens of said polarized glasses is oriented in a similar manner as said left eye filter and wherein a right lens of said polarized glasses is oriented in a similar manner as said right eye filter."

122. On information and belief, Defendant Microsoft's accused methods, computer readable mediums, and systems (*e.g.*, HoloLens 2) embody each limitation of the dependent claims 3, 5-6, 9, 11-12, and 16-18 of the '766 patent. Evidence of such infringement is provided in **Exhibit 7** (dependent claims 16-18 are representative). Reasonable discovery will confirm this infringement.

Defendant's Direct Infringement of the Method Claims

123. Defendant performs the methods recited in claims 1, 3, and 5-6 of the '766 patent. Infringement of a method claim requires performing every step of the claimed method. Defendant performs every step of the methods recited in claims 1, 3, and 5-6. As set forth *supra*, Defendant performs, for example, the method recited in claim 1, i.e., "1. A method of three-dimensional viewing of images by a user comprising: passing left eye viewing point (LEVP) imagery through a left eye filter having a first orientation to obtain a filtered LEVP imagery; passing right eye viewing point (REVP) imagery through a right eye filter having a second orientation, said second orientation different than said first orientation to obtain a filtered REVP imagery, wherein said different orientation of said right eye filter with said left eye filter comprises one of the group consisting of: said left eye filter is ninety degrees apart from said right eye filter when said left eye filter and said right eye filter are linear polarization filters; said left eye filter is an opposite handedness with respect to said right eye filter when said left eye filter and said right eye filter are circular polarization filters; and said left eye filter is a chromatically opposite color than said right eye filter

when said left eye filter and said right eye filter are anaglyph color filters; projecting said filtered LEVP imagery on a display; projecting said filtered REVP imagery on said display wherein said filtered REVP imagery is superimposed over said filtered LEVP imagery; and wherein a user wearing polarized glasses is able to view said filtered LEVP imagery and said filtered REVP imagery as three dimensional imagery on said display, wherein a left lens of said polarized glasses is oriented in a similar manner as said left eye filter and wherein a right lens of said polarized glasses is oriented in a similar manner as said right eye filter."

124. Even if one or more steps recited in method claims 1, 3, and 5-6 are performed through technologies (*e.g.*, HoloLens 2) not in the physical possession of the Defendant (*e.g.*, in the possession of Microsoft partners, resellers, developers, end-users, etc.), the claimed methods are specifically performed by Microsoft's HoloLens technology. Defendant directly infringes as its VR/AR technology dictate the performances of the claimed steps, such as the "passing left eye," "passing right eye," "said left eye filter is ninety degrees," "said left eye filter is an opposite handedness," "said left eye filter is a chromatically opposite color," "projecting said filtered LEVP imagery," "projecting said filtered REVP imagery," and "wearing polarized glasses" steps recited in claim 1 of the '766 patent. On information and belief, Defendant's products and services are designed and built by Defendant to perform the claimed steps automatically. On information and belief, only Defendant can modify the functionality relating to these activities; no one else can modify such functionality. Defendant

therefore performs all the claimed steps and directly infringes the asserted method claims of the '766 patent, as demonstrated in **Exhibit 7** (claim 13 is representative).

125. ***Additionally or alternatively***, to the extent third parties or end-users perform one or more steps of the methods recited in claims 1, 3, and 5-6 of the '766 patent, any such action by third parties or end-users is attributable to Defendant, such that Defendant is liable for directly infringing such claims in a multiple actor or joint infringement situation, because Defendant directs or controls the other actor(s). In this regard, Defendant conditions participation in activities, as well as the receipt of benefits, upon performance of any such step by any such third party or end-user. Defendant retains control over how the accused methods are performed (*e.g.*, by having built and designed its products and services, for example the HoloLens 2 to automatically perform the claimed method limitations). Defendant exercises control over the methods performed by *e.g.*, the HoloLens 2, and benefits from others' use, including without limitation creating and receiving ongoing revenue streams from the accused products and related goods, and improvement/enhancement of its products and related goods. End-users and third parties receive a benefit from fiscal gains (*e.g.*, third-party resellers; partners increasing the value of their own products and services) and through VR/AR capabilities (which have both recreational and professional benefits across a broad spectrum of applications (*e.g.,* medical care, military operations, construction, industry, education, science, gaming, etc.)). In fact, VR/AR capabilities form the basis of entire businesses, such as some businesses held by

Microsoft partners – over whom Microsoft exercises additional control with requirements for partnership (and for developers). All third-party and end-user involvement with the accused methods, if any, is incidental, ancillary, or contractual.

126. Thus, to the extent that any step of the asserted method claims is performed by someone other than Defendant (*e.g.,* an end-user or third party), Defendant nonetheless directly infringes the '766 patent at least by one or more of: (1) providing products and services (*e.g.*, HoloLens 2) built and designed to perform methods covered by the asserted method claims; (2) dictating via software and associated directions and instructions (*e.g.*, to end-users) the use of the accused products such that, when used as built and designed by Defendant, such products perform the claimed methods; (3) having the ability to terminate others' access to and use of the accused products and related goods and services if the accused products are not used in accordance with Defendant's required terms (*e.g.*, revocation of partnership or developer agreement); (4) marketing and advertising the accused products, and otherwise instructing and directing the use of the accused products in ways covered by the asserted method claims; and (5) updating and providing ongoing support and maintenance for the accused products.

Defendant's Direct Infringement of the Computer Readable Medium and Computer System Claims

127. Defendant makes, uses, sells, offers to sell, and/or imports the computer readable mediums recited in claims 7, 9, and 11-12 and the computer systems recited in claims 13 and 16-18. Such claims are infringed when an accused medium and/or

accused system, having every element of the claimed medium and/or claimed system, is made, used, sold, offered for sale, or imported within the United States. Defendant makes, uses, sells, offers to sell, and/or imports the accused products (or cause such acts to be performed on its behalf), which possess every element recited in claims 7, 9, and 11-12 and claims 13 and 16-18, as set forth in more detail *supra* and demonstrated in **Exhibit 7** attached (claims 13 and 16-18 are representative). Defendant therefore directly infringes the system claims of the '766 patent.

128. ***Additionally or alternatively,*** regarding any "use" of the accused systems "by customers," which is a subset of the direct infringement of system claims, Defendant directly infringes in such situations, as Defendant puts the accused systems into service and, at the same time, controls the system as a whole and obtains benefit from it. Defendant provides all components in the system and controls all aspects of its functionality. Although third parties (*e.g.*, Microsoft partners, resellers, developers, etc.) and end-users (*e.g.*, customers.) may have physical control over certain aspects of the accused systems, Defendant retains control over how the accused system operates (*e.g.*, by having built and designed its products and services, for example the HoloLens 2, to automatically perform the claimed system limitations). Defendant conditions participation in activities, as well as the receipt of benefits, upon performance of any such step by any such third party or end-user. Defendant exercises control over its systems and benefit from others' use of its systems, including without limitation creating and receiving ongoing revenue streams from the accused system, and

improvement/enhancement of its systems. End-users and third parties receive a benefit from fiscal gains (*e.g.*, third-party resellers; partners increasing the value of their own system and services) and through VR/AR capabilities (which have both recreational and professional benefits across a broad spectrum of applications (*e.g.*, medical care, construction, education, science, gaming, etc.)). In fact, VR/AR capabilities form the basis of entire businesses, such as some businesses held by Microsoft partners. All third-party and end-user involvement with the accused systems, if any, is incidental, ancillary, or contractual.

129. ***In the alternative,*** if the end-user or third-party is deemed to put the invention into service and controls the system as a whole, the end-user and third-party benefit from each element of the claims because Defendant's system (*e.g.*, HoloLens 2) are designed and built by Defendant to perform the claimed steps automatically. End-users receive a benefit from putting the invention into service, thereby accessing VR/AR capabilities as discussed *supra*. Third parties (*e.g.*, Microsoft partners, resellers, developers etc.) receive a benefit from putting the invention into service by improving their own systems and profits. Further, and on information and belief, third-party partners and developers share a fiscally/contractually beneficial relationship with Microsoft. In both cases, Microsoft would be liable as an inducing infringer as described *infra*.

130. Thus, to the extent that any step of the asserted system claims is performed by someone other than Defendant (*e.g.*, an end-user or third party),

Defendant nonetheless directly infringes the '766 patent at least by one or more of: (1) providing products and services (*e.g.*, HoloLens 2) built and designed to perform system functionalities covered by the asserted system claims; (2) dictating via software and associated directions and instructions (*e.g.*, to end-users) the use of the accused products such that, when used as built and designed by Defendant, such products perform the claimed systems; (3) marketing and advertising the accused products, and otherwise instructing and directing the use of the accused products in ways covered by the asserted method claims; and (4) updating and providing ongoing support and maintenance for the accused products.

Induced Infringement

131. Defendant has induced and will continue to induce others' infringement of the '766 patent, including but not limited to, claims 1, 3, 5-7, 9, 11-13, and 16-18 of the '766 patent, in violation of 35 U.S.C. § 271(b). At least no later than August 28, 2017, based on Dr. David Douglas's in person discussions with Microsoft HoloLens personnel, and certainly not later than May 7, 2019, based on Dr. David Douglas's correspondence with Microsoft HoloLens personnel, Defendant has actively encouraged infringement of the '766 patent, knowing that the acts it induced constituted infringement of the '766 patent, and its encouraging acts actually resulted in direct patent infringement by others.

132. On information and belief, Defendant has and continues to promote, advertise, and support end-users (*e.g.,* customers, etc.) and third parties (*e.g.*, Microsoft

partners, resellers, developers, etc.) of its HoloLens 2 products, with actions to include, but not limited to the following:

a. Defendant advertises Microsoft's HoloLens products on its website, *e.g.*, https://www.microsoft.com/en-us/hololens/buy (last visited April 5, 2021);

b. Defendant provides end-user and third-party solutions and support – documentation, instructions, Q&As, Code Samples, etc. – on its website, *e.g.*, https://www.microsoft.com/en-us/hololens/apps (business and tech solutions) (last visited April 5, 2021), https://docs.microsoft.com/en-us/hololens/ (how-to support documentation, instructions, code samples, etc.) (last visited April 5, 2021), and https://developer.microsoft.com/en-us/mixed-reality/ (developer support and documentation) (last visited April 5, 2021);

c. Defendant provides an extensive partner and reseller program for selling, supporting, and using its HoloLens technologies, *e.g.*, https://www.microsoft.com/en-us/hololens/mixed-reality-partners (last visited April 5, 2021), and actively advertise for new partners to join, https://www.microsoft.com/en-us/hololens/mrpp (last visited April 5, 2021);

d. Defendant provides a developer program for outside tech developers to build and manage applications and solutions with its HoloLens

technologies, *e.g.*, https://www.microsoft.com/en-us/hololens/developers (last visited April 5, 2021) and https://mixedreality.microsoftcrmportals.com/en-US/signup/ (last visited April 5, 2021).

Defendant controls the distribution and use of its HoloLens technologies – and further controls requirements for partners and developers. On information and belief, Defendant continues to engage in these acts with knowledge of the '766 patent at least no later than August 28, 2017, per Dr. David Douglas's in person discussion with Microsoft HoloLens personnel, and certainly not later than May 7, 2019 per Dr. David Douglas's correspondence with Microsoft HoloLens personnel, with the actual intent to cause the acts which it knew or should have known would induce actual infringement.[4] Microsoft continues marketing the accused products despite receiving notice of the '766 patent and its purported infringement at least no later than August 28, 2017 – Dr. David Douglas explicitly told Microsoft personnel of several pending patents, including the '766 patent – and certainly no later than May 7, 2019, based on Dr. David Douglas's correspondence with Microsoft HoloLens personnel explicitly listing the '766 patent.

[4] As a factual matter, Microsoft certainly knew of the '766 and '691 patents and Microsoft's infringement thereof as of the Original Complaint to this matter filed September 16, 2020. Microsoft also knew of the '457 patent and its infringement thereof as of the First Amended and Supplement Complaint to this matter filed November 20, 2020.

133. As described in paragraphs 27-32, which are incorporated here by reference, Microsoft knew or should have known it was infringing the '766 patent, and thereby knew or should have known it was inducing others to infringe. To this end, Microsoft knew or should have known it was infringing the '766 patent at least no later than August 28, 2017, at which point Dr. David Douglas provided Microsoft HoloLens personnel detailed information on D3D's patented technology. While wearing the HoloLens device, Dr. David Douglas explained to Microsoft HoloLens personnel that the HoloLens performed certain of D3D's patented features, including, *inter alia*:

a. a filtering process as patented by D3D;

b. generating volumes by arranging slices as patented by D3D;

c. stereoscopic 3D imaging as patented by D3D; and

d. zooming in with convergence point shifting as patented by D3D.

Through Dr. David Douglas's clear statements, and in the context of the entire August 28, 2017 conversation (including discussions on D3D's technology, patents, and related articles), Microsoft knew or should have known it was infringing the '766 patent, or otherwise exercised willful blindness. Moreover, in the context of the August 28, 2017 conversation, combined with Dr. David Douglas's May 7, 2019 email (explicitly informing Microsoft of the '766 patent), Microsoft knew or should have known it was infringing the '766 patent no later than May 7, 2019, or otherwise exercised willful blindness.

134. To the extent Defendant does not specify and control relevant VR/AR capabilities of the accused products and services in the claimed manner (which it does), Defendant – with full knowledge of the '766 patent – actively encourages others (*e.g.*, end-users and third parties) – to use the accused products and services as claimed. Such active encouragement by Defendant takes many forms, such as those examples provided *supra*, and includes promotion and instructional materials, as well as technical specifications and requirements, and ongoing technical assistance.

135. On information and belief, Defendant engaged in these acts with the actual intent to cause the acts which it knew or should have known would induce actual infringement, or otherwise exercised willful blindness of a high probability that it has induced infringement.

Contributory Infringement

136. Defendant has contributed and will continue to contribute to others' infringement of the '766 patent, including but not limited to, claims 1, 3, 5-7, 9, 11-13, and 16-18 of the '766 patent, in violation of 35 U.S.C. § 271(c). Defendant has offered to sell and sold within the United States, or imported into the United States, at least some of the components of the claimed methods (claims 1, 3, and 5-6), mediums (claims 7, 9, and 11-12), and systems (claims 13 and 16-18) constituting a material part of the patented methods, mediums, and systems, knowing the same to be especially made or especially adapted for use in infringing the '766 patent, and not a staple article or commodity of commerce for substantial non-infringing use.

137. As discussed *supra*, Defendant had actual and constructive knowledge of the '766 patent, as well as actual and constructive knowledge of the relevance and significance of the '766 patent to its research, development, production, and sales at least no later than August 28, 2017 per Dr. David Douglas's in person discussion with Microsoft HoloLens personnel, and certainly not later than May 7, 2019, based on Dr. David Douglas's correspondence with Microsoft HoloLens personnel.

138. As described in paragraph 27-32 and 133, which are incorporated here by reference, Microsoft knew or should have known it was infringing the '766 patent no later than August 28, 2017, and certainly not later than May 7, 2019, and thereby knew or should have known it was contributing to others' infringement.

139. To the extent Defendant does not specify and control relevant VR/AR capabilities of the accused products and services in the claimed manner (which it does), Defendant – with full knowledge of the '766 patent – supplies the accused products to others (*e.g.*, end-users and third parties) to perform the claimed method, medium, and system steps. The accused products and services embody the VR/AR capabilities of the '766 patent, in a manner that constitutes a material part of the claimed inventions if not the entire claimed inventions. Defendant dictates and controls the componentry, techniques, and uses of the accused products and services, with full knowledge of the '766 patent, and know the same to be especially made and especially adapted for the infringement of the '766 patent.

140. On information and belief, the relevant portions of Defendant's products and services (*e.g.*, HoloLens 2 technologies), which Microsoft made, marketed, used, sold, offered to sell, or imported, are not stable articles or commodities of commerce suitable for substantial non-infringing use.

Willful Infringement

141. As discussed *supra* and specifically in Paragraphs 27-32, which are incorporated herein by reference, Defendant had actual and constructive knowledge of the '766 patent, as well as actual and constructive knowledge of the relevance and significance of the '766 patent to its research, development, production, and sales at least no later than August 28, 2017 per Dr. David Douglas's in person discussion with Microsoft HoloLens personnel, and certainly no later than May 7, 2019 per Dr. David Douglas's correspondence with Microsoft HoloLens personnel.

142. Defendant therefore had continuing actual and constructive knowledge of D3D's patent portfolio, most specifically the '766 patent, and the relevance and significance of D3D's patented technology.

143. Defendant's infringement, as demonstrated *supra*, is egregious, and combined with Defendant's clear knowledge, has been willful. Plaintiff respectfully requests that the Court award enhanced damages based on Defendant's conduct.

Damage to D3D Technologies Inc.

144. On information and belief, Defendant's actions have and will continue to constitute direct and indirect (induced and contributory) infringement of at least claims 1, 3, 5-7, 9, 11-13, and 16-18 of the '766 patent in violation of 35 U.S.C. §271.

145. As a result of Defendant's infringement of at least claims 1, 3, 5-7, 9, 11-13, and 16-18 of the '766 patent, D3D has suffered monetary damages in an amount yet to be determined, in no event less than a reasonable royalty, and will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

146. Defendant's wrongful acts have damaged and will continue to damage D3D irreparably, and Plaintiff has no adequate remedy at law for those wrongs and injuries. In addition to its actual damages, Plaintiff D3D is entitled to a permanent injunction restraining and enjoining Defendant and its respective agents, servants, and employees, and all person acting thereunder, in concert with, or on its behalf, from infringing at least claims 1, 3, 5-7, 9, 11-13, and 16-18 of the '766 patent.

COUNT IV
INFRINGEMENT OF THE '691 PATENT

147. Plaintiff D3D repeats and realleges Paragraphs 1 through 32 and 39, which are incorporated by reference as if fully restated herein.

148. Plaintiff D3D is the owner by assignment of all right, title, and interest and to in the '691 patent, including the right to recover for any and all infringement thereof.

149. Defendant is not licensed or otherwise authorized to practice the '691 patent.

150. Plaintiff D3D has not licensed or otherwise authorized Defendant under the '691 patent.

151. The '691 patent is valid and enforceable, and presumed valid under 35 U.S.C. § 282.

152. The '691 patent relates to, among other things, methods, apparatus, and computer program product for three-dimensional viewing and manipulation of images.

153. On information and belief, Defendant has infringed the '691 patent by making, having made, using, importing, providing, supplying, distributing, testing, selling, or offering for sale a method, apparatus, and computer program product for three-dimensional viewing and manipulation of images, as described and claimed in the '691 patent. For example, Microsoft's HoloLens 2, described in Paragraph 39 *supra*, infringes the '691 patent.

154. On information and belief, Defendant continues to engage in infringing acts, as described *supra*, with knowledge of the '691 patent at least no later than August 28, 2017 per Dr. David Douglas's in person conversation with Microsoft personnel as described in Paragraphs 27-32, and certainly not later than May 7, 2019 per D3D correspondence with Microsoft officers, and with the actual intent to cause the acts

which it knew or should have known would directly infringe, individually or jointly, and induce actual infringement.

Defendant's Direct Infringement of the '691 Patent:

155. On information and belief, in violation of 35 U.S.C. § 271(a), Defendant has directly infringed, continues to directly infringe, and will continue to directly infringe, individually or jointly, absent this Court's intervention one or more claims of the '691 patent, including for example at least method claims 1-9 and 12-21 of the '691 patent, either literally or under the doctrine of equivalents, by making, distributing, using, testing, selling, and/or offering to sell within the United States, or importing into the United States, without license or authority, Defendant's suite of virtual reality and augmented reality products, including, but not limited to, the HoloLens 2.

Direct Infringement Allegations

156. ***Direct Infringement Claim Charts***: **Exhibit 8** illustrates how Microsoft's HoloLens 2 perform the claimed methods. Such infringement of the '691 patent by HoloLens 2 is exemplified in **Exhibit 8**. Such supplied evidence is illustrative, and not exhaustive. Further, a person of ordinary skill in the art would readily recognize the broader implications of these representative materials.

157. On information and belief, as demonstrated in **Exhibit 8**, and by way of example only, Defendant Microsoft performs each limitation of claim 1 of the '691 patent:

"1. A method comprising:
generating a three-dimensional image space or volume from a plurality of two-dimensional radiological image slices;
generating a three-dimensional cursor that has a non-zero volume;
displaying the three-dimensional cursor in the three-dimensional medical image space or volume;
responsive to a first input, moving said three-dimensional cursor within the three-dimensional medical image space or volume; and
responsive to a second input, selecting portions of the two-dimensional radiological image slices corresponding to the volume of the three-dimensional cursor for further processing."

158. On information and belief, as demonstrated in **Exhibit 8** (claim 1 is representative), and by way of example only, Defendant Microsoft performs each limitation of claim 20 of the '691 patent:

"20. A method comprising:
generating a three-dimensional image space or volume from a plurality of two-dimensional radiological image slices;
generating a three-dimensional cursor that has a non-zero volume;
displaying the three-dimensional cursor in the three-dimensional medical image space or volume;
responsive to a first input, moving said three-dimensional cursor within the three-dimensional medical image space or volume; and
responsive to a second input, constructing a custom object by:
delineating a volume of interest, comprising selecting portions of the two-dimensional radiological image slices corresponding to the volume of the three-dimensional cursor for further processing;
subtracting tissue which is not of interest;
applying a smoothing process to eliminate irregular edges of voxels in the volume; and
passing the resulting volume to computerized manufacturing."

159. Defendant performs the methods recited in claims 1-9 and 12-21 of the '691 patent. Infringement of a method claim requires performing every step of the claimed method. For example, the Defendant performs every step of the method recited in claim 1, *i.e.*, "A method comprising: generating a three-dimensional image

space or volume from a plurality of two-dimensional radiological image slices; generating a three-dimensional cursor that has a non-zero volume; displaying the three-dimensional cursor in the three-dimensional medical image space or volume; responsive to a first input, moving said three-dimensional cursor within the three-dimensional medical image space or volume; and responsive to a second input, selecting portions of the two-dimensional radiological image slices corresponding to the volume of the three-dimensional cursor for further processing." In addition, the Defendant performs every step of the methods recited in claims 2-9, 12-19 and 21. Defendant's performance of the claimed method infringes the '691 patent, as illustrated in **Exhibit 8**. As shown in **Exhibit 8**, and by way of example only, Defendant Microsoft's accused products (*e.g.*, HoloLens 2) embody each limitation of claims 1-9 and 12-21.

160. Even if one or more steps recited in method claims 1-9 and 12-21 of the '691 patent are performed on technologies (*e.g.*, HoloLens) not in the physical possession of the Defendant (*e.g.*, in the possession of Microsoft partners, resellers, developers, end-users, etc.), the claimed methods are specifically performed by Microsoft's HoloLens technology. Defendant directly infringes as its VR/AR technology dictate the performances of the claimed steps, such as the "modifying" (claim 2), "moving" (claim 3), "removing or extracting" (claim 4), "rotating" (claim 5), "counting" (claim 6), "converging" (claim 7), "using" (claim 8), "invoking" (claim 9), "applying" (claim 12), "saving" (claim 13), "displaying" (claim 14), "designating"

(claim 15), "registering" (claim 16), "superimposing" (claim 17), "invoking" (claim 18), "recording and displaying" (claim 19), and "selected" (claim 21) steps of the '691 patent. Defendant therefore performs all the claimed steps and directly infringes the asserted method claims of the '691 patent.

161. ***Additionally or alternatively***, to the extent third parties or end-users perform one or more steps of the methods recited in claims 1-9 and 12-21 of the '691 patent, any such action by third parties or end-users is attributable to Defendant, such that Defendant is liable for directly infringing such claims in a multiple actor or joint infringement situation, because Defendant directs or controls the other actor(s). In this regard, Defendant conditions participation in activities, as well as the receipt of benefits, upon performance of any such step by any such third party or end-user. Defendant retains control over how the accused methods are performed (*e.g.*, by having built and designed its products and services, for example the HoloLens 2 to automatically perform the claimed method limitations). Defendant exercises control over the methods performed by *e.g.*, the HoloLens 2, and benefit from others' use, including without limitation creating and receiving ongoing revenue streams from the accused products and related goods, and improvement/enhancement of its products and related goods. End-users and third parties receive a benefit from fiscal gains (*e.g.*, third-party resellers; partners increasing the value of their own products and services) and through VR/AR capabilities (which have both recreational and professional benefits across a broad spectrum of applications (*e.g.*, medical care, military

operations, construction, industry, education, science, gaming, etc.). In fact, VR/AR capabilities form the basis of entire businesses, such as some businesses held by Microsoft partners – over whom Microsoft exercises additional control with requirements for partnership (and for developers). All third-party and end-user involvement with the accused methods, if any, is incidental, ancillary, or contractual.

162. Thus, to the extent that any step of the asserted method claims is performed by someone other than Defendant (e.g., an end-user or third party), Defendant nonetheless directly infringes the '691 patent at least by one or more of: (1) providing products and services (*e.g.*, HoloLens 2) built and designed to perform methods covered by the asserted method claims; (2) dictating via software and associated directions and instructions (*e.g.*, to end-users) the use of the accused products such that, when used as built and designed by Defendant, such products perform the claimed methods; (3) having the ability to terminate others' access to and use of the accused products and related goods and services if the accused products are not used in accordance with Defendant's required terms (*e.g.*, revocation of partnership or developer agreement); (4) marketing and advertising the accused products, and otherwise instructing and directing the use of the accused products in ways covered by the asserted method claims; and (5) updating and providing ongoing support and maintenance for the accused products.

Induced Infringement

163. Defendant has induced and will continue to induce others' infringement of the '691 patent, including but not limited to, claims 1-9 and 12-21 of the '691 patent, in violation of 35 U.S.C. § 271(b). At least no later than August 28, 2017, based on Dr. David Douglas's in person discussions with Microsoft HoloLens personnel, and certainly not later than May 7, 2019, based on Dr. David Douglas's correspondence with Microsoft HoloLens personnel, Defendant has actively encouraged infringement of the '691 patent, knowing that the acts it induced constituted infringement of the '691 patent, and its encouraging acts actually resulted in direct patent infringement by others.

164. On information and belief, Defendant has and continues to promote, advertise, and support end-users (*e.g.,* customers, etc.) and third parties (*e.g.*, Microsoft partners, resellers, developers, etc.) of its HoloLens 2, with actions to include, but not limited to the following:

a. Defendant advertises Microsoft's HoloLens products on its website, *e.g.*, https://www.microsoft.com/en-us/hololens/buy (last visited April 5, 2021);

b. Defendant provides end-user and third-party solutions and support – documentation, instructions, Q&As, Code Samples, etc. – on its website, *e.g.*, https://www.microsoft.com/en-us/hololens/apps (business and tech solutions) (last visited April 5, 2021),

https://docs.microsoft.com/en-us/hololens/ (how-to support documentation, instructions, code samples, etc.) (last visited April 5, 2021), and https://developer.microsoft.com/en-us/mixed-reality/ (developer support and documentation) (last visited April 5, 2021);

c. Defendant provides an extensive partner and reseller program for selling, supporting, and using its HoloLens technologies, *e.g.*, https://www.microsoft.com/en-us/hololens/mixed-reality-partners (last visited April 5, 2021), and actively advertise for new partners to join, https://www.microsoft.com/en-us/hololens/mrpp (last visited April 5, 2021);

d. Defendant provides a developer program for outside tech developers to build and manage applications and solutions with its HoloLens technologies, *e.g.*, https://www.microsoft.com/en-us/hololens/developers (last visited April 5, 2021) and https://mixedreality.microsoftcrmportals.com/en-US/signup/ (last visited April 5, 2021).

Defendant controls the distribution and use of its HoloLens technologies – and further controls requirements for partners and developers. On information and belief, Defendant continues to engage in these acts with knowledge of the '691 patent at least no later than August 28, 2017, per Dr. David Douglas's in person discussion with Microsoft HoloLens personnel, and certainly not later than May 7, 2019 per Dr. David

Douglas's correspondence with Microsoft HoloLens personnel, with the actual intent to cause the acts which it knew or should have known would induce actual infringement. Microsoft continues marketing the accused products despite receiving notice of the '691 patent and its purported infringement at least no later than August 28, 2017 – Dr. David Douglas explicitly told Microsoft personnel of several pending patents, including the '691 patent – and certainly no later than May 7, 2019, based on Dr. David Douglas's correspondence with Microsoft HoloLens personnel explicitly listing the '691 patent.

165. As described in paragraphs 27-32, which are incorporated here by reference, Microsoft knew or should have known it was infringing the '691 patent, and thereby knew or should have known it was inducing others to infringe. To this end, Microsoft knew or should have known it was infringing the '691 patent at least no later than August 28, 2017, at which point Dr. David Douglas provided Microsoft HoloLens personnel detailed information on D3D's patented technology. While wearing the HoloLens device, Dr. David Douglas explained to Microsoft HoloLens personnel that the HoloLens performed certain of D3D's patented features, including, *inter alia:*

a. a filtering process as patented by D3D;

b. generating volumes by arranging slices as patented by D3D;

c. stereoscopic 3D imaging as patented by D3D; and

d. zooming in with convergence point shifting as patented by D3D.

Through Dr. David Douglas's clear statements, and in the context of the entire August 28, 2017 conversation (including discussions on D3D's technology, patents, and related articles), Microsoft knew or should have known it was infringing the '691 patent, or otherwise exercised willful blindness. Moreover, in the context of the August 28, 2017 conversation, combined with Dr. David Douglas's May 7, 2019 email (explicitly informing Microsoft of the '691 patent), Microsoft knew or should have known it was infringing the '691 patent no later than May 7, 2019, or otherwise exercised willful blindness.

166. To the extent Defendant does not specify and control relevant VR/AR capabilities of the accused products in the claimed manner (which it does), Defendant – with full knowledge of the '691 patent – actively encourages others (*e.g.*, end-users and third parties) – to use the accused products as claimed. Such active encouragement by Defendant takes many forms, such as those examples provided *supra*, and includes promotion and instructional materials, as well as technical specifications and requirements, and ongoing technical assistance.

167. On information and belief, Defendant engaged in these acts with the actual intent to cause the acts which it knew or should have known would induce actual infringement, or otherwise exercised willful blindness of a high probability that it has induced infringement.

Contributory Infringement

168. Defendant has contributed and will continue to contribute to others' infringement of the '691 patent, including but not limited to, claims 1-9 and 12-21 of the '691 patent, in violation of 35 U.S.C. § 271(c). Defendant has offered to sell and sold within the United States, or imported into the United States, at least some of the components of the claimed method, claims 1-9 and 12-21, constituting a material part of the patented method, knowing the same to be especially made or especially adapted for use in infringing the '691 patent, and not a staple article or commodity of commerce for substantial non-infringing use.

169. As discussed *supra*, Defendant had actual and constructive knowledge of the '691 patent, as well as actual and constructive knowledge of the relevance and significance of the '691 patent to its research, development, production, and sales at least no later than August 28, 2017 per Dr. David Douglas's in person discussion with Microsoft HoloLens personnel, and certainly not later than May 7, 2019, based on Dr. David Douglas's correspondence with Microsoft HoloLens personnel.

170. As described in 27-32 and 165, which are incorporated here by reference, Microsoft knew or should have known it was infringing the '691 patent no later than August 28, 2017, and certainly not later than May 7, 2019, and thereby knew or should have known it was contributing to others' infringement.

171. To the extent Defendant does not specify and control relevant VR/AR capabilities of the accused products in the claimed manner (which it does), Defendant

– with full knowledge of the '691 patent – supplies the accused products to others (*e.g.*, end-users and third parties) to perform the claimed method steps. The accused products embody the VR/AR capabilities of the '691 patent, in a manner that constitutes a material part of the claimed inventions if not the entire claimed inventions. Defendant dictates and controls the componentry, techniques, and uses of the accused products, with full knowledge of the '691 patent, and know the same to be especially made and especially adapted for the infringement of the '691 patent.

172. On information and belief, the relevant portions of Defendant's products (*e.g.*, HoloLens 2), which Microsoft made, marketed, used, sold, offered to sell, or imported, are not stable articles or commodities of commerce suitable for substantial non-infringing use.

Willful Infringement

173. As discussed *supra* and specifically in Paragraphs 27-32, which are incorporated herein by reference, Defendant had actual and constructive knowledge of the '691 patent, as well as actual and constructive knowledge of the relevance and significance of the '691 patent to its research, development, production, and sales at least no later than August 28, 2017 per Dr. David Douglas's in person discussion with Microsoft HoloLens personnel, and certainly no later than May 7, 2019 per Dr. David Douglas's correspondence with Microsoft HoloLens personnel.

174. Defendant therefore had continuing actual and constructive knowledge of D3D's patent portfolio, most specifically the '691 patent, and the relevance and significance of D3D's patented technology.

175. Defendant's infringement, as demonstrated *supra*, is egregious, and combined with Defendant's clear knowledge, has been willful. Plaintiff respectfully requests that the Court award enhanced damages based on Defendant's conduct.

Damage to D3D Technologies Inc.

176. On information and belief, Defendant's actions have and will continue to constitute direct and indirect (induced and contributory) infringement of at least claims 1-9 and 12-21 of the '691 patent in violation of 35 U.S.C. §271.

177. As a result of Defendant's infringement of at least claims 1-9 and 12-21 of the '691 patent, D3D has suffered monetary damages in an amount yet to be determined, in no event less than a reasonable royalty, and will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

178. Defendant's wrongful acts have damaged and will continue to damage D3D irreparably, and Plaintiff has no adequate remedy at law for those wrongs and injuries. In addition to its actual damages, Plaintiff D3D is entitled to a permanent injunction restraining and enjoining Defendant and its respective agents, servants, and employees, and all person acting thereunder, in concert with, or on its behalf, from infringing at least claims 1-9 and 12-21 of the '691 patent.

COUNT V
INFRINGEMENT OF THE '457 PATENT

179. Plaintiff D3D repeats and realleges Paragraphs 1 through 32 and 39, which are incorporated by reference as if fully restated herein.

180. Plaintiff D3D is the owner by assignment of all right, title, and interest in and to the '457 patent, including the right to recover for any and all infringement thereof.

181. Defendant is not licensed or otherwise authorized to practice the '457 patent.

182. Plaintiff D3D has not licensed or otherwise authorized Defendant under the '457 patent.

183. The '457 patent is valid and enforceable, and presumed valid under 35 U.S.C. § 282.

184. The '457 patent relates to, among other things, methods and apparatus for an interactive three-dimensional cursor to facilitate selection and manipulation of three-dimensional volumes from any three-dimensional image.

185. On information and belief, Defendant has infringed the '457 patent by making, having made, using, importing, providing, supplying, distributing, testing, selling, or offering for sale an apparatus for three-dimensional selection and manipulation of a three-dimensional volume from any three-dimensional image, as described and claimed in the '457 patent. For example, Microsoft's HoloLens 2, described in Paragraph 39 *supra*, infringes the '457 patent.

186. On information and belief, Defendant continues to engage in infringing acts, as described *supra*, with knowledge of the '457 patent and with the actual intent to cause the acts which it knew or should have known would directly infringe, individually or jointly.

Defendant's Direct Infringement of the '457 Patent:

187. On information and belief, in violation of 35 U.S.C. § 271(a), Defendant has directly infringed, continues to directly infringe, and will continue to directly infringe, individually or jointly, absent this Court's intervention one or more claims of the '457 patent, including for example at least apparatus claims 70-80, 84, 89-97, 99, 103, and 107 of the '457 patent, either literally or under the doctrine of equivalents, by making, distributing, using, testing, selling, and/or offering to sell within the United States, or importing into the United States, without license or authority, Defendant's suite of virtual reality and augmented reality products, including, but not limited to, the HoloLens 2.

Direct Infringement Allegations

188. ***Direct Infringement Claim Charts***: **Exhibit 12** illustrates how Microsoft's HoloLens 2 possess the capabilities and/or features of the claimed apparatuses, and therefore infringe the '457 patent. Such supplied evidence is illustrative, and not exhaustive. Further, a person of ordinary skill in the art would readily recognize the broader implications of these representative materials.

189. On information and belief, as demonstrated in **Exhibit 12**, and by way of example only, Defendant Microsoft's accused products incorporate the capabilities and/or features of each limitation of claim 70 of the '457 patent:

> "70. An apparatus comprising:
> a computing device; and
> a human-machine interface comprising a three-dimensional cursor that has a non-zero volume;
> the human-machine interface configured to select a volume of the three-dimensional image designated by the three-dimensional cursor, wherein the three-dimensional cursor encloses the volume of the three-dimensional image responsive to an input; and
> the human-machine interface configured to present a modified version of the selected volume of the three-dimensional image responsive to another input,
> wherein the human-machine interface is further configured to display: orthogonal cross-sectional imaging slices, wherein the slices are marked with a corresponding visible boundary of the three-dimensional cursor, reference lines from the three-dimensional cursor to the orthogonal cross-sectional imaging slices, the three-dimensional cursor and results from a statistical analysis performed on contents of the three-dimensional cursor."

190. On information and belief, as demonstrated in **Exhibit 12**, and by way of example only, Defendant Microsoft's accused products incorporate the capabilities and/or features of each limitation of claim 89 of the '457 patent:

> "89. An apparatus comprising:
> a computing device; and
> a human-machine interface comprising a three-dimensional cursor that has a non-zero volume;
> the human-machine interface configured to select a volume of the three-dimensional image designated by the three-dimensional cursor, wherein the three-dimensional cursor encloses the volume of the three-dimensional image responsive to an input; and
> the human-machine interface configured to present a modified version of the selected volume of the three-dimensional image responsive to another input,
> wherein the human-machine interface is further configured to display; a stack of contiguous cross-sectional imaging slices, wherein the slices are marked with a corresponding visible boundary of the three-dimensional cursor,

reference lines from the three-dimensional cursor to the stack of contiguous cross-sectional imaging slices, the three-dimensional cursor and results from a statistical analysis performed on contents of the three-dimensional cursor."

191. Defendant performs the apparatuses recited in claims 70-80, 84, 89-97, 99, 103, and 107 of the '457 patent. Infringement of an apparatus claim requires that the accused products incorporate all the capabilities and/or features recited in the claims of the infringed patent. *See Finjan, Inc. v. Secure Computing Corp.*, 626 F.3d 1197, 1204 (Fed. Cir. 2010) (holding that the patentee must show that the accused product "is reasonably capable of satisfying the claim limitations, even though it may also be capable of noninfringing modes of operation.") (internal citations omitted). Microsoft's HoloLens 2 technology is reasonably capable of satisfying the claimed limitations of the '457 patent. For example, Defendant's products incorporate every limitation or element of the apparatus recited in claim 70, *i.e.*, "An apparatus comprising: a computing device; and a human-machine interface comprising a three-dimensional cursor that has a non-zero volume; the human-machine interface configured to select a volume of the three-dimensional image designated by the three-dimensional cursor, wherein the three-dimensional cursor encloses the volume of the three-dimensional image responsive to an input; and the human-machine interface configured to present a modified version of the selected volume of the three-dimensional image responsive to another input, wherein the human-machine interface is further configured to display: orthogonal cross-sectional imaging slices, wherein the slices are marked with a corresponding visible boundary of the three-dimensional

cursor, reference lines from the three-dimensional cursor to the orthogonal cross-sectional imaging slices, the three-dimensional cursor and results from a statistical analysis performed on contents of the three-dimensional cursor." In addition, Defendant's products incorporate every limitation or element of the apparatuses recited in claims 71-80, 84, 89-97, 99, 103, and 107, as set forth in **Exhibit 12**. As shown in **Exhibit 12**, and by way of example only, Defendant Microsoft's accused products (*e.g.*, HoloLens 2) embody each limitation of claims 70-80, 84, 89-97, 99, 103, and 107.

Damage to D3D Technologies Inc.

192. On information and belief, Defendant's actions have and will continue to constitute direct infringement of at least claims 70-80, 84, 89-97, 99, 103, and 107 of the '457 patent in violation of 35 U.S.C. §271.

193. As a result of Defendant's infringement of at least claims 70-80, 84, 89-97, 99, 103, and 107 of the '457 patent, D3D has suffered monetary damages in an amount yet to be determined, in no event less than a reasonable royalty, and will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

194. Defendant's wrongful acts have damaged and will continue to damage D3D irreparably, and Plaintiff has no adequate remedy at law for those wrongs and injuries. In addition to its actual damages, Plaintiff D3D is entitled to a permanent injunction restraining and enjoining Defendant and its respective agents, servants, and

employees, and all person acting thereunder, in concert with, or on its behalf, from infringing at least claims 70-80, 84, 89-97, 99, 103, and 107 of the '457 patent.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff D3D respectfully requests that this Court enter:

A. A judgment in favor of Plaintiff D3D that Defendant has been and is infringing at least claims 1-21 of the '771 patent, claims 1-18 of the '183 patent, claims 1, 3, 5-7, 9, 11-13, and 16-18 of the '766 patent, claims 1-9 and 12-21 of the '691 patent, and claims 70-80, 84, 89-97, 99, 103, and 107 of the '457 patent, pursuant to 35 U.S.C. §§ 271(a) and/or 271(b);

B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in concert or privity with any of them from infringing, or inducing the infringement of, at least claims 1-21 of the '771 patent, claims 1-18 of the '183 patent, claims 1, 3, 5-7, 9, 11-13, and 16-18 of the '766 patent, claims 1-9 and 12-21 of the '691 patent, and claims 70-80, 84, 89-97, 99, 103, and 107 of the '457 patent;

C. A judgment awarding Plaintiff D3D all damages adequate to compensate it for Defendant's infringement of the patents-in-suit under 35 U.S.C. § 284, and in no event less than a reasonable royalty for Defendant's acts of infringement, including all pre-judgement and post-judgment interest at the maximum rate permitted by law, and also any past damages permitted under 35 U.S.C. § 286, as a result of Defendant's infringement of at least at least claims 1-21 of the '771 patent, claims 1-18 of the '183

patent, claims 1, 3, 5-7, 9, 11-13, and 16-18 of the '766 patent, claims 1-9 and 12-21 of the '691 patent, and claims 70-80, 84, 89-97, 99, 103, and 107 of the '457 patent;

D. An assessment of costs, including reasonable attorney fees pursuant to 35 U.S.C. § 285, and prejudgment interest against Defendant; and

E. Any other and further relief as this Court may deem just and proper.

JURY TRIAL DEMANDED

Pursuant to FED. R. CIV. P. 38(b), Plaintiff D3D hereby demands a trial by jury on all issues so triable.

Dated: April 5, 2021

Respectfully submitted,

By: */s/ Charles E. Cantine*
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Attorneys for Plaintiff D3D Technologies, Inc.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that, on April 5, 2021, I electronically filed the foregoing document with the Clerk of the Court by using the CM/ECF system, which will send a notice of electronic filing to all counsel of record.

/s/ Charles E. Cantine
Charles E. Cantine