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**Pro hac vice application forthcoming*

Attorneys for Plaintiff Clear Imaging Research, LLC

IN THE UNITED STATES DISTRICT COURT

SOUTHERN DISTRICT OF CALIFORNIA

CLEAR IMAGING RESEARCH, LLC **Plaintiff,** **v.** **APPLE INC.** **Defendant.**	**Case No.** '23CV673 GPC DEB **COMPLAINT FOR PATENT INFRINGEMENT** **DEMAND FOR JURY TRIAL**

Plaintiff Clear Imaging Research, LLC ("Clear Imaging," or "Plaintiff") files this Complaint for patent infringement against Defendant Apple Inc. ("Apple") for infringement of 9,860,450 ("the '450 patent"), 10,171,740 ("the '740 patent"), 10,382,689 ("the '689 patent"), 11,457,149 ("the '149 patent"), 11,490,015 ("the '015 patent"), 11,627,254 ("the '254 patent"), and 11,627,391 ("the '391 patent") (collectively the "patents-in-suit"), pursuant to 35 U.S.C. § 271. The patents-in-suit are attached as Exhibits A-G.

I. PARTIES AND CASE INTRODUCTION

1. Plaintiff Clear Imaging is a limited liability company organized and existing under laws of the State of Delaware. Plaintiff Clear Imaging has its principal place of business in New York and an office at 40 West 25th Street, 9th Floor, New York, New York 10010.

2. Upon information and belief, Defendant Apple is a company organized and existing under the laws of the State of California, with its principal place of business at One Apple Park Way, Cupertino, California 95014.

3. The patents-in-suit are infringed by at least Apple's iPhone 6, iPhone 6s, iPhone 6 Plus, iPhone 6s Plus, iPhone 7, iPhone 7 Plus, iPhone 8, iPhone 8 Plus, iPhone X, iPhone XR, iPhone XS, iPhone XS Max, iPhone 11, iPhone 11 Pro, iPhone 11 Pro Max, iPhone 12, iPhone 12 Mini, iPhone 12 Pro, iPhone 12 Pro Max, iPhone SE, iPhone 13, iPhone 13 Mini, iPhone 13 Pro, iPhone 13 Pro Max, iPhone 14, iPhone 14 Plus, iPhone 14 Pro, iPhone 14 Pro Max, and all iPhones with substantially similar functionality ("Accused iPhones"), iPad Pro 11-inch (all generations), and iPad Pro 12.9 inch (at least 2nd generation and later), iPad Air (at least 3rd generation and later), iPad mini (at least 5th generation and later), iPad (at least 8th generation and later), and all iPads with substantially similar functionality ("Accused iPads") (collectively the accused iPhones and accused iPads are the

"Accused Products").[1]

4. Clear Imaging and Apple have had various in-person meetings, telephonic calls, and other correspondence regarding Clear Imaging's technology since at least 2017.

5. Apple's biggest competitor, Samsung, licensed Clear Imaging's valuable technology prior to trial in *Clear Imaging Research, LLC v. Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc.*, No. 2:19-cv-326 (E.D. Tex. filed October 1, 2019), which involved some of the same patents at issue here. Numerous others that make camera products have also paid for a license to Clear Imaging's technology. Apple, however, still has not taken a license to Clear Imaging's technology and instead has continued to sell hundreds of millions of infringing devices in the U.S. at great profit to Apple.

6. Apple has long been aware of Clear Imaging's technology. Indeed, when Apple sought to patent image and video stabilization technology in 2014 with what became Apple's U.S. Patent No. 9,300,969, almost a decade after Clear Imaging filed the non-provisional application which the patents-in-suit claim the benefit of priority, the Patent Office rejected Apple's patent under the "teachings of [Clear Imaging founder] Ozluturk" which taught a particular way of "correcting the discrepancy between the motion of an electronic device and the motion reflected in the video frames of that electronic device." *See* File History of U.S. Patent No. 9,300,969. And even after Apple's lawyers traveled to the Patent Office to discuss Dr. Ozluturk's technology and patent disclosure in-person with the Patent Office in 2015, the Patent Office still would not allow Apple's patent until Apple amended its patent claims to a narrower scope. *Id*. Apple has since cited the Clear Imaging

[1] For clarity, all iterations of these devices, including plus, s, mini, pro, and pro max versions are accused to the extent not already listed. All generations of iPhone SE (including 1st, 2nd, 3rd, and iPhone SE (2020) are accused).

patents in dozens of its own own digital image and video stabilization patents, continually recognizing Clear Imaging as a pioneer in the camera field.

7. At bottom, after almost 6 years of discussions with Apple and numerous attempts by Clear Imaging to get Apple to take a license for Apple's infringing use of Clear Imaging's technology, as well as Apple's knowledge of Clear Imaging's technology for almost a decade as shown by the Patent Office records, Clear Imaging has no choice but to file this lawsuit to protect its Intellectual Property. Clear Imaging has invested significant resources in developing its Intellectual Property. Apple should not be allowed to use Clear Imaging's Intellectual Property for free, particularly when others, including its biggest competitor Samsung and numerous others, have paid for a license to Clear Imaging's valuable technology that has made groundbreaking advancements in camera technology.

II. CLEAR IMAGING'S BACKGROUND AND HISTORY OF GROUNDBREAKING INNOVATION

8. Clear Imaging was founded by Fatih Ozluturk, a Ph.D. in Electrical Engineering, distinguished engineer, the sole inventor on each of the patents-in-suit, and an accomplished innovator. Indeed, Dr. Ozluturk is an inventor on over 235 issued U.S. patents and numerous pending patent appliations, making him one of the most prolific patentees living in the United States. Dr. Ozluturk has a history of inventing solutions that have proved to be significant beyond camera technology and include multiple generations of wireless technologies, including 3G, and 4G LTE. It has been said that "Fatih's groundbreaking inventions span multiple generations of wireless technology and directly benefit the entire wireless ecosystem and billions of consumers globally."[2]

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[2] *See, e.g.,* https://www.businesswire.com/news/home/20110418006517/en/InterDigital-Honors-Dr.-Fatih-Ozluturk-Inventor-Named.

9. After receiving his Ph.D. in Electrical Engineering from the University of Massachusetts, Amherst, Dr. Ozluturk went to work as an engineer at InterDigital, a mobile technology research and development company based in Delaware that currently has over 500 employees. Dr. Ozluturk worked at InterDigital for almost seventeen years and became one of the most prolific inventors at InterDigital. Dr. Ozluturk received a number of awards for his technical leadership and innovation, including the "Outstanding Young Engineer" award from the Long Island Chapter of the IEEE in 2001 and the "Chairman's Award" from InterDigital in 2011.

10. Since leaving InterDigital in 2012, Dr. Ozluturk has been Chief Executive Officer of Clear Imaging. Dr. Ozluturk is also an active member of the New York startup community, where he regularly teaches workshops at startup accelerators on topics related to entrepreneurial management, finance of innovation, and intellectual property. He mentors technology startups as a Venture Partner at a leading New York City startup accelerator.

11. In March 2004 and March 2005, Dr. Ozluturk filed the provisional and non-provisional applications, respectively, of which the patents-in-suit claim the benefit of priority. This was years before the very first iPhone was even released.

12. Many years after Dr. Ozluturk's inventions and the release of the first iPhone, Apple would release products with camera features such as Portrait Mode, Cinematic Mode, video stabilization functionality (including Cinematic Video Stabilization, Action Mode, and/or Video Image Stabilization), and image stabilization functionality (including Sensor-Shift Stabilization, Auto-Image Stabilization, Multi-Frame Image Processing, Deep Fusion, and/or Night Mode) and infringe Dr. Ozluturk's inventions.

13. It is noteworthy that Apple released products with the above-functionality many years after Dr. Ozluturk's inventions, and, for some of this functionality, *a decade or more* after Dr. Ozluturk's inventions, underscoring how

pioneering Dr. Ozluturk's work is. And when Apple did finally release its infringing products, Apple would tout them as groundbreaking advancements in camera technology, notwithstanding the fact that Dr. Ozluturk had filed for patent protection on these innovations many years earlier.

III. CLEAR IMAGING AND APPLE

14. Clear Imaging and Apple have had several in-person meetings, dozens of phones phone calls, and exchanged numerous emails and letters over the past six years. An abbreviated discussion of some of the relevant events is below.

15. On July 25, 2017, Clear Imaging sent a notice letter to Apple.

16. On August 11, 2017, Apple emailed Clear Imaging in response to Clear Imaging's July 25, 2017 letter. On January 2, 2018, Clear Imaging had a call with an Apple in-house counsel. After additional discussion, the parties held an in-person meeting.

17. On November 14, 2018, Dr. Ozlutuk and Mr. Garland, Clear Imaging's Chief Licensing Officer, had another in-person meeting with Apple. Clear Imaging stated that the '450 patent is infringed by Apple's video stabilization.

18. Apple has never provided any basis of non-infringement of the '450 patent.

19. On May 21, 2019, Clear Imaging provided Apple additional claim charts, including on the '450 patent and '740 patents.

20. Apple has never provided any basis of non-infringement of the '740 patent for its dual-camera products, which, on information and belief, began with the iPhone 7 Plus.

21. On October 1, 2019, Clear Imaging sued Samsung for patent infringement, including on the '450 and '740 patents.

22. In mid-2021, following the resolution of Clear Imaging's litigation with Samsung, Clear Imaging and Apple had multiple conversations but Apple still did

not take a license.

23. On May 16, 2022, Clear Imaging emailed Apple providing a new chart on the '689 patent.

24. Apple has never provided any basis of non-infringement or invalidity of the '689 patent.

25. On November 18, 2022, Clear Imaging emailed Apple and provided two new charts on the '015 and '149 patents.

26. Apple never provided any basis of non-infringement or invalidity of the '015 or '149 patents.

27. On January 31, 2023, the parties exchanged additional correspondence.

28. After years of correspondence with Apple, Clear Imaging was left with no choice but to file suit to enforce its intellectual property rights.

IV. JURISDICTION AND VENUE

29. This is an action for patent infringement under the patent laws of the United States, 35 U.S.C. § 271. This court has jurisdiction over federal question claims pursuant to 28 U.S.C. §§ 1331 and 1338(a).

30. The Court has personal jurisdiction over Apple because Apple is organized and exits under the laws of California.

31. Venue is proper in this Court pursuant to 28 U.S.C. §§ 1391 and 1400(b).

32. Venue is appropriate under 28 U.S.C. § 1400(b) at least because Apple is incorporated in California and because Apple has committed acts of infringement and has a regular and established place of business in this district.

33. Apple's acts of infringement in this district include but are not limited to sales of the Accused Products at Apple Store locations in this district, including but not limited to 7007 Friars Road, San Diego, CA 92108 and 4505 La Jolla Village Drive, San Diego, CA 92122.

34. Apple's Apple Stores in San Diego County alone employ at least 600 people, and likely much more.[3]

35. In addition to the Apple Stores, Apple has a regular and established place of business in University City, San Diego, including a "100,000 square-foot research/office building" and a second 204,000 square-foot building employing thousands of Apple employees.[4] Apple states that the San Diego "location has plans for extensive growth throughout this area."[5] Indeed, Apple is currently "one of the top technology employers in the greater San Diego area."[6] According to San Diego records, Apple's corporate office addresses include at least 12220 Scripps Summit Dr, San Diego, CA 92131-3698.[7]

36. Apple has stated that it needs "hundreds of thousands of square feet" of real estate in San Diego to accommodate its growing team in the area.[8] As part of Apple's explosive growth in San Diego, in 2022, Apple purchased a seven-building research and development space of over 67 acres in the Rancho Vista Corporate Center in San Diego for $445 million.[9] Apple stated it plans to hire 5,000 employees in San Diego by 2026, and thousands of Apple employees already work in the San

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[3] https://www.sandiegouniontribune.com/business/technology/sd-fi-applehiring-san-diego-20190306-story.html.

[4] https://www.sandiegouniontribune.com/business/technology/story/2019-11-13/apple-inks-deal-for-second-utc-building-as-part-of-san-diego-expansoin.

[5] https://www.apple.com/careers/us/work-at-apple/san-diego.html.

[6] https://www.sandiegouniontribune.com/pomerado-news/business/story/2022-06-15/apple-grows-presence-in-rancho-bernardo-now-largest-tech-tenant-in-the-market.

[7] https://opengovus.com/san-diego-business/2021009134#:~:text=Apple%20Inc%20%28408%29%20996-1010%20·%2012220%20Scripps%20Summit,City%20Treasurer%20of%20the%20City%20of%20San%20Diego.

[8] https://www.pacificcoastcommercial.com/post/apple-leases-full-building-inexpansion-in-san-diego-high-tech-hub.

[9] https://appleinsider.com/articles/22/07/27/apple-buys-new-campus-for-445-million-for-vast-san-diego-expansion.

Diego area. Indeed, Apple decided in 2021 to decentralize and reduce its Cupertino office, given the costs of the San Francisco Bay Area among other reasons, and to instead focus its growth on the San Diego area among a handful of other select locations, meaning, not only is San Diego critical to Apple today, but it will become even more so in the future.[10]

37. Since 2019, Apple has been the employer of at least 653 recipients of H-1B visas who work and reside in San Diego.[11] There were 339 recipients in 2022, 171 recipients in 2021, 89 recipients in 2020, and 54 recipients in 2019. The rapidly increasing number of H-1B recipients aligns with Apple's exponential growth in the San Diego area.

38. Apple is currently advertising a staggering 498 jobs in San Diego.[12] A focus of Apple's San Diego offices is camera technology, the technology at issue in this suit. At least 26 jobs that Apple currently is advertising relate to engineering roles on camera technology.[13]

39. Apple has recently advertised jobs directly relevant to the accused technology. For example, Apple recently advertised, and appears to have filled, jobs directly relevant to the accused functionality, including one for a "Camera Tuning & Image Quality Engineer" in "San Diego, CA" to work on "Portrait Mode" and "image quality tuning of iOS cameras algorithms."[14]

40. A number of Apple camera engineers directly working on accused camera functionality appear to be located in the San Diego area and likely would

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[10] https://www.bloomberg.com/news/newsletters/2021-07-04/apple-hq-is-no-longer-the-center-of-the-company-s-universe-kqpi2879.

[11] https://h1bdata.info/index.php?em=APPLE+INC&job=&city=SAN+DIEGO&year=All+Years.

[12] https://jobs.apple.com/en-us/search?location=san-diego-SDO.

[13] https://jobs.apple.com/en-us/search?search=camera&sort=relevance&location=san-diego-SDO.

[14] https://www.linkedin.com/jobs/view/2989630741/.

have relevant information for this lawsuit. For example, Yixuan Wang, Apple's Camera Tuning and Image Quality Engineering Manager, who formerly worked in Apple's Cupertino offices, appears to have re-located to San Diego in 2022 and is "Hiring in San Diego!"[15] Her LinkedIn profile recently posted about the "extraordinary work happening in our San Diego location," presumably related to the development of the accused camera functionality and products that infringe Clear Imaging's patents, which is "just the beginning" for San Diego.[16]

41. Other relevant Apple camera engineers in San Diego appear to be working directly on the accused camera technology, many of whom have been hired by Apple away from Qualcomm's camera development team as part of Apple's rapid growth in camera engineering in San Diego. To cite just a few examples, Majot Singh Bilkhu, who formerly worked at Qualcomm on its "Camera Systems for Snapdragon," now works at Apple in San Diego on camera technology, including "Deep Learning R&D for Semantic Segmentation" and Pichaya Lertvilai is a "Camera Hardware Engineer" in San Diego."[17] Sean Chang, who also worked on image quality at Qualcomm for over a decade, was recently hired in early 2023 by Apple as a "Camera tuning engineer" in San Diego to work on "camera image quality." These individuals likely have relevant knowledge as to Apple's infringing functionality, as well as relevant facts regarding the validity of the patents-in-suit, including its non-obviousness and the fact that the inventions were anything but routine, common, and conventional at the time of invention, because these individuals have long-histories of working in the field of camera image and video stabilization at both Qualcomm and Apple, two leading suppliers of this technology.

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[15] https://www.linkedin.com/in/yixuan-wang-a79448b8.
[16] https://www.linkedin.com/in/yixuan-wang-a79448b8.
[17] https://www.linkedin.com/in/plertvilai.
https://www.linkedin.com/in/manjotms10.

42. Apple has also litigated in San Diego, taking advantage of the forum for Apple's own offensive patent litigations as well as defensive patent litigations. For example, Apple sued Qualcomm and Motorola Mobility LLC for patent infringement in this District in 2017 and 2012, respectively.[18] Apple also frequently seeks to transfer patent cases into the Southern District of California, taking advantage of the forum for its defensive patent litigations, repeatedly representing to courts that the Southern District of California is convenient for Apple and an appropriate place for Apple to litigate, including because California courts have state-wide subpoena power over any witness in California under Fed. R. Civ. P. 45(c)(3)(A)(ii) and Cal. Civ. Proc. Code § 1989.[19]

V. THE ASSERTED PATENTS

43. On January 2, 2018, the United States Patent and Trademark Office issued U.S. Patent No. 9,860,450 ("the '450 patent"), entitled "Method and Apparatus to Correct Digital Video to Counteract Effect of Camera Shake" after full and fair examination. Plaintiff is the assignee of all rights, title, and interest in and to the '450 patent and possesses all rights of recovery under the '450 patent, including the right to recover damages for present, past, and future infringement. The '450 patent is valid and enforceable.

44. On January 1, 2019, the United States Patent and Trademark Office issued U.S. Patent No. 10,171,740 ("the '740 patent"), entitled "Method and Apparatus to Correct Blur in All or Part of a Digital Image By Combining Plurality

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[18] *Apple Inc. v. Qualcomm Inc.*, No. 3:17-cv-108 (S.D. Cal. Jan. 20, 2017); *Apple Inc. v. Motorola Mobility, Inc.*, No. 3:12-cv-355 (S.D. Cal. Feb. 10, 2012).

[19] *See, e.g., Fastvo LLC v. Apple Inc. et al,* No. 3:16-cv-385, Dkt. 75 (S.D. Cal. Feb. 17, 2016) (transferring case from Eastern District of Texas); *see also Wi-LAN USA, Inc. et al. v. Apple Inc.,* No. 3:13-cv-00798-DMS-BLM, Dkt. 39 (S.D. Cal. Feb. 20, 2013) (transferring case from Southern District of Florida based on Apple's argument that "SD Cal is clearly more convenient for Apple" and emphasizing that California courts have state-wide subpoena power).

of Images," after full and fair examination. Plaintiff is the assignee of all rights, title, and interest in and to the '740 patent and possesses all rights of recovery under the '740 patent, including the right to recover damages for present, past, and future infringement. The '740 patent is valid and enforceable.

45. On August 13, 2019, the United States Patent and Trademark Office issued U.S. Patent No. 10,382,689 ("the '689 patent"), entitled "Method and Apparatus for Capturing Stabilized Video in an Imaging Device," after full and fair examination. Plaintiff is the assignee of all rights, title, and interest in and to the '689 patent and possesses all rights of recovery under the '689 patent, including the right to recover damages for present, past, and future infringement. The '689 patent is valid and enforceable.

46. On September 27, 2022, the United States Patent and Trademark Office issued U.S. Patent No. 11,457,149 ("the '149 patent"), entitled "Method and Apparatus for Capturing Digital Video," after full and fair examination. Plaintiff is the assignee of all rights, title, and interest in and to the '149 patent and possesses all rights of recovery under the '149 patent, including the right to recover damages for present, past, and future infringement. The '149 patent is valid and enforceable.

47. On November 1, 2022, the United States Patent and Trademark Office issued U.S. Patent No. 11,490,015 ("the '015 patent"), entitled "Method and Apparatus for Capturing Digital Video," after full and fair examination. Plaintiff is the assignee of all rights, title, and interest in and to the '015 patent and possesses all rights of recovery under the '015 patent, including the right to recover damages for present, past, and future infringement. The '015 patent is valid and enforceable.

48. On April 11, 2023, the United States Patent and Trademark Office issued U.S. Patent No. 11,627,254 ("the '254 patent"), entitled "Method and Apparatus for Capturing Digital Video," after full and fair examination. Plaintiff is the assignee of all rights, title, and interest in and to the '254 patent and possesses

all rights of recovery under the '254 patent, including the right to recover damages for present, past, and future infringement. The '254 patent is valid and enforceable.

49. On April 11, 2023, the United States Patent and Trademark Office issued U.S. Patent No. 11,627,391 ("the '391 patent"), entitled "Method and Apparatus for Capturing Digital Video," after full and fair examination. Plaintiff is the assignee of all rights, title, and interest in and to the '391 patent and possesses all rights of recovery under the '391 patent, including the right to recover damages for present, past, and future infringement. The '391 patent is valid and enforceable.

50. The inventions of the patents-in-suit address technological problems and provide technological solutions to issues that were not well-understood, routine, or conventional at the time of the inventions. The patents' disclosures and claims are drawn to solving specific, technical problems, as a person of ordinary skill in the art reading the patents-in-suit and their claims would understand. Moreover, a person of ordinary skill in the art would understand that the claimed subject matter represents advancement in the technical fields of the patents-in-suit and provide improvements over the prior art and inventive concepts. The claims do not preempt all techniques for or approaches to accomplishing the same or a similar end to what they recite, for example, including the prior art. The large amount of prior art cited on the faces, none of which, as the Examiners found, discloses or render obvious the claimed inventions further shows that the claims were not well-understood, routine, or conventional at the time of the inventions.

51. The claimed inventions of the '740 and '149 patents resolve technological problems related to reducing unwanted distortion or blur when capturing images with a camera, and, further, to correcting a selected part or subject of an image while another part or subject of the image is blurred compared to the selected part or subject. *See, e.g.*, '740, abstract; 10:55-11:6; Col. 12:20-29. The patents further teach that it may be desirable to make a designated subject in a field

of view clear and sharp whereas other parts of the image may be blurred. *Id*. The patents further teach that it is desirable to have techniques that correct for distortion in photographs without adding excessively to the price, robustness or weight of a camera or other imaging device. '740, Col. 2:20-33. The patents further teach that "[i]n the prior art, electro-mechanical devices for correcting image blur due to camera motion are built into some high quality lenses" and "[t]hese devices seek to compensate for the camera/lens movement by moving one or more of the lens elements." *Id*. However, adding such a device to a lens typically makes the lens much more expensive, heavier and less sturdy, and can also compromise image quality. *Id*. Because existing solutions did not provide effective correction of unwanted distortion or blur, and at the same time provide an effective way for a designated subject in a field of view to be clear and sharp whereas other parts of the image may be blurred, particularly for devices that were light-weight and not excessively expensive, a need existed for solutions that would better (*e.g.*, faster, more accurately, less expensively, *etc.*) provide these features without adding excessively to the price, compromising robustness, or increasing weight of the imaging device. *Id*. The claimed inventions of the '740 and '149 patents provide solutions that solve these problems.

52. The claims of the '740 and '149 patents do not merely recite the performance of some business practice known from the precomputer world along with the requirement to perform it on a computer. Instead, the claims of these patents recite inventive concepts in digital image processing technology, and overcome technical problems specifically arising in that realm. A person of ordinary skill in the art reading these patents would understand that the patents' disclosure and claims are drawn to solving a specific, technical problem. The claims do not preempt the use of all techniques taught in the field. For example, they do not preempt the use of the techniques taught in the prior art cited on the face of the patents or described

in the specification. Each claim of these patents recites a combination of elements sufficient to ensure that the claim in practice amounts to significantly more than a patent claiming an abstract idea.

53. The claimed inventions of the '450 and '689 patents resolve technological problems related to reducing motion blur using a digital image processing technique that can take advantage of measurements of motion of the imaging device from motion sensors and present advantages over electro-mechanical devices that compensate using only lens movement. *See, e.g.,* '450, Col. 2:6-30. The patents further teach that it is desirable to correct for distortion in photographs without adding excessively to the price, compromising robustness or increasing weight of a camera or other imaging device. *Id*. The patents further teach that "[i]n the prior art, electro-mechanical devices for correcting image blur due to camera motion are built into some high quality lenses" and "[t]hese devices seek to compensate for the camera/lens movement by moving one or more of the lens elements." *Id*. However, adding such a device to a lens typically makes the lens much more expensive, heavier and less sturdy, and can also compromise image quality. *Id*. Because existing solutions did not provide effective correction of unwanted distortion or blur, particularly for devices that were light-weight and not excessively expensive, a need existed for solutions that would better (*e.g.*, faster, more accurately, less expensively, *etc.*) provide such correction through without adding excessively to the price, compromising robustness, or increasing weight of the imaging device. *Id.* The claimed inventions of the '450 and '689 patents provide solutions that solve this problem.

54. The claims of the '450 and '689 patents do not merely recite the performance of some business practice known from the precomputer world along with the requirement to perform it on a computer. Instead, the claims of the '450 and '689 patents recite one or more inventive concepts that are rooted in digital

image processing technology, and overcome technical problems specifically arising in that realm. A person of ordinary skill in the art reading the '450 and '689 patents would understand that the patents' disclosure and claims are drawn to solving a specific, technical problem. The claims do not preempt the use of all techniques taught in the field. For example, they do not preempt the use of the techniques taught in the prior art cited on the face of the patents or described in the specification. Each claim of the '450 and '689 patents recites a combination of elements sufficient to ensure that the claim in practice amounts to significantly more than a patent claiming an abstract idea.

55. The claims of the '254 patent resolve technological problems related to reducing unwanted distortion or blur when capturing images with a camera. Common problems that significantly degrade the quality of a photograph are the blur that results from camera movement (or shaking) at the time the photograph is taken, the blur that results when a portion of the image is moving, and equipment errors. '254 patent at 1:43-2:45. Unwanted distortion or blur can be difficult to avoid, especially when a slow shutter speed is used, such as in low light conditions, or when a large depth of field is needed and the lens aperture is small. *Id.* At the time of invention, commonly used techniques for increasing the sharpness of an image did not really "correct" the blur that resulted, for example, from motion of a camera. *Id.* at 2:25-28. In fact, data loss from these prior techniques could result in a less accurate image than the original. *Id.* at 2:28-30. The patents further teach that "[i]n the prior art, electro-mechanical devices for correcting image blur due to camera motion are built into some high quality lenses" and "[t]hese devices seek to compensate for the camera/lens movement by moving one or more of the lens elements." *Id.* at 2:28-55. However, adding such a device to a lens typically makes the lens much more expensive, heavier and less sturdy, and can also compromise image quality. *Id.* at 2:38-41. Because existing solutions did not provide effective

correction of unwanted distortion or blur, particularly for devices that were light-weight and not excessively expensive, a need existed for solution that would better (*e.g.*, faster, more accurately, less expensively, *etc.*) correct unwanted distortion or blur without adding excessively to the price, compromising robustness, or increasing weight of the imaging device and without compromising image quality. *Id.* at 2:32-45. The claimed inventions of the '254 patent provide solutions that solve these problems. The '254 patent teaches, and claims in certain claims, particular techniques, including, for example, determining an offset for each image in a sequence of images and processing the sequence of images to calculate pixel values for a corrected image by taking into account the offset calculated for the images. *See, e.g., Id.* at 10:15-11:23; Fig. 11. The '254 patent also teaches, and claims in certain claims, particular techniques, including, for example, determining a number of images to be captured, and determine a shutter speed for the images to be captured, receive a number of image captured by the image sensor using the shutter speed determined, and process the sequence of images to calculate pixel values for a corrected image based on pixel values in the sequence of images. *Id.* In addition, the '254 patent teaches, and claims in certain claims, receiving sequence of images, designated a subject and a background in the sequence of images, processing the sequence of images to obtain a final image such that the designated subject in the final image is blur free and the background in the final image is blurred. In addition, the '254 patent teaches, and claims in certain claims, that motion information from one or more motion sensors may be received and used to cause one or more image sensor adjusters to move the image sensor inside the imaging apparatus based on the motion information. *See, e.g., Id.* at 11:24-12:3; Fig. 12.

56. The claims of the '254 patent do not merely recite the performance of some business practice known from the precomputer world along with the requirement to perform it on a computer. Instead, the claims of the '254 patent recite

inventive concepts in digital image processing technology, and overcome technical problems specifically arising in that realm. A person of ordinary skill in the art reading the '254 patent would understand that the patents' disclosure and claims are drawn to solving a specific, technical problem. The claims do not preempt the use of all techniques taught in the field. For example, they do not preempt the use of the techniques taught in the prior art cited on the face of the patents or described in the specification. Each claim of the '254 patent recites a combination of elements sufficient to ensure that the claim in practice amounts to significantly more than a patent claiming an abstract idea.

57. The claimed inventions of the '015 and '391 patents resolve technological problems related to reducing unwanted distortion or blur when capturing images and video with a camera, and, further, to correcting a selected part or subject of an image while another part or subject of the image is blurred compared to the selected part or subject. *See, e.g.*, '015, abstract; Col. 11:24-12:52; 13:7-16. The patents further teach that it may be desirable to make a designated subject in a field of view clear and sharp whereas other parts of the image may be blurred. *Id*. The patents further teach that it is desirable to have techniques that correct for distortion in photographs without adding excessively to the price, robustness or weight of a camera or other imaging device. *Id.* at 2:6-30. The patents further teach that "[i]n the prior art, electro-mechanical devices for correcting image blur due to camera motion are built into some high quality lenses" and "[t]hese devices seek to compensate for the camera/lens movement by moving one or more of the lens elements." *Id*. However, adding such a device to a lens typically makes the lens much more expensive, heavier and less sturdy, and can also compromise image quality. *Id*. Because existing solutions did not provide effective correction of unwanted distortion or blur, and at the same time provide an effective way for a designated subject in a field of view to be clear and sharp whereas other parts of the

image may be blurred, particularly for devices that were light-weight and not excessively expensive, a need existed for solutions that would better (*e.g.*, faster, more accurately, less expensively, *etc.*) provide these features without adding excessively to the price, compromising robustness, or increasing weight of the imaging device. *Id*. The claimed inventions of the '015 and '391 patents provide solutions that solve these problems.

58. The claims of the '015 and '391 patents do not merely recite the performance of some business practice known from the precomputer world along with the requirement to perform it on a computer. Instead, the claims of these patents recite inventive concepts in digital image processing technology, and overcome technical problems specifically arising in that realm. A person of ordinary skill in the art reading these patents would understand that the patents' disclosure and claims are drawn to solving a specific, technical problem. The claims do not preempt the use of all techniques taught in the field. For example, they do not preempt the use of the techniques taught in the prior art cited on the face of the patents or described in the specification. Each claim of these patents recites a combination of elements sufficient to ensure that the claim in practice amounts to significantly more than a patent claiming an abstract idea.

59. Apple's own statements cited here and throughout this complaint regarding accused products and functionalities provide further evidence that the patented technologies were not well-understood, routine, or conventional at the time of the invention. In all of the parties' discussions over the last six years, Apple also never asserted that any of the patents-in-suit are well-understood, routine, or conventional or are directed to an abstract idea.

60. When Apple released its Portait Mode with iPhone 7 Plus in 2016, it commented on what a "big breakthrough in photography" had been accomplished

by providing a way to provide an image with a subject that is clear and sharp while the background is blurred in "something that goes in your pocket."

61. For traditional point and shoot cameras, "you can change the focal length to zoom in…and that works great when you have a large camera with a big lens on it that can move in and out. That isn't so great when the lens you want to put in is something that goes in your pocket…[Portrait Mode on the iPhone was] incredibly challenging and takes a lot of amazing invention. What the [Apple engineers] have been doing is outstanding and is something that is a big breakthrough in photography…[A photo with a clear subject and a beautiful background is] illustrative of a great camera that often has a big sensor like a full-frame sensor or a really big fast lens. And the quality of the background blur, that's what's called Bokeh. And the higher the quality of Bokeh, usually the more advanced the higher quality the lens and camera system. End result is the person is almost popping off the screen. It feels 3-D. Our goal is to do something like this using the 2 cameras in the iPhone 7 Plus. What the engineering team has been doing, hardware and software working together, is truly remarkable…When we take a picture…You use machine learning to recognize people and faces and then create a depth map of that image from the two cameras and the software. Keep the people in the front sharp and focused and apply a beautiful blur to the background. This is a huge breakthrough in what can be done in smartphone photography…You select 'Portrait' and it automatically jumps to using the telefoto lens."[20] Apple's comments further show the novelty, non-obviousness, and inventive concept of Clear Imaging's patents, including the '740, '149, '015, and '391 patents, by recognizing more than a decade later what the Clear Imaging patents already taught, including that particular techniques in the digital domain can be used to create images and

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[20] https://www.youtube.com/watch?v=7ICPvlyfR5o (7:05-7:25, 9:22-9:40, and 10:15-11).

video on devices that previously were only attempted using a "large camera with a big lens." But, as the Clear Imaging patents teach, it is desirable to have techniques on devices "without adding excessively to the price, robustness or weight of a camera or other imaging device, or adversely affecting image quality." '015 patent, Col. 2:41-44. Moreover, when Apple discussed in 2021 its new Cinematic Mode, which is relevant to at least the '740, '149, '015 and '391 patents, Apple would call this functionality "really awesome," an "all-new" feature, and state that the "iPhone 13 and the iPhone 13 Pro are the only smartphones that can do this."[21] Apple's own statements to technology described in the Clear Imaging patents as "groundbreaking," exciting, *etc.*, more than a decade after Clear Imaging's inventions further shows that the claims of the Clear Imaging patents recite subject matter that was far more than common, routine, or conventional at the time of invention.

62. Likewise, Apple has made statements that show that Clear Imaging's '450 and '689 patent claims relate to a particular type of video stabilization technology which is far more than common, routine, or conventional. For example, when Apple itself applied for a video stabilization patent, Apple's patent was rejected based on the Clear Imaging patents. *See supra* Section I. Apple's own patents also recognize, again almost a decade later, what Dr. Ozluturk recognized much earlier. For example, Apple filed a patent in 2012 stating that using on-board positional sensors (accelerometers and/or gyrometers) to provide particular compensation techniques for positional shifts in the digital domain were "novel motion compensation techniques" in 2012 and provided solutions that were otherwise "thought to be impossible from either computational and/or power consumption standpoints":

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[21] https://www.youtube.com/watch?v=EvGOlAkLSLw.

> Some video capture devices now include "on board motion sensors, i.e., positional sensors (e.g., accelerometers and/or gyrometers), which may be used to assist in various device functions. For example, some devices may use gyrometer data to aid in image stabilization by appropriately adjusting the device's lens and/or sensor mechanism before an image or frame is captured. Once captured, however, the image is retained as part of the video sequence without substantial modification. This approach is not, however, feasible for many devices incorporating video capture capability. For example, at this time, it is generally considered infeasible to provide movable lens mechanisms and the like in such small form factor devices. Accordingly, there is a need for techniques to reduce the effects of rolling shutter distortion during image and video capture in devices utilizing CMOS or other non-CCD image sensors. By employing appropriate perspective transformations to captured image databased on timestamped information gathered from positional sensors in communication with the image capture device, more efficient image processing techniques may be employed to reduce the effects of rolling shutter distortion. By using novel motion compensation techniques, informed by hardware motion sensors, such as positional sensors, in communication with an image capture device, a robust rolling shutter reduction system may be employed, even in situations where reliably reducing rolling shutter distortion effects was *previously thought to be impossible from either computational and/or power consumption standpoints*.[22]

63. In addition, Sensor-Shift stabilization technology combined with other techniques for generating an image in the digital domain from multiple images,

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[22] U.S. Patent No. 8,913,140 at Col. 1:59-2:20.

which is relevant to the '254 patent was heralded by Apple and others as a tremendous achievement, and far more than something that was routine, common, and conventional technology, even as late as 2020. For example, Apple called Sensor-Shift stabilization technology a "massive leap in camera design" and stated that "Sensor-shift OIS – a technology introduced in iPhone 12 Pro Max and [is] not found in any other smartphone."[23] Third-parties also stated that "Sensor shift stabilization is coming to all iPhone 13 models and it is the biggest innovation in stabilization technology on phones in literally a decade."[24]

64. A person of ordinary skill in the art reading the patents-in-suit and their claims would understand that the patent's disclosure and claims are drawn to solving a specific, technical problem arising in photography. Moreover, a person of ordinary skill in the art would understand that the claimed subject matter presents advancements in the field of digital image processing. The claims do not preempt all types of digital image processing. For example, the claims do not preempt use of the techniques taught in the prior art cited on the face of the patents-in-suit. In light of the foregoing, a person of ordinary skill in the art would understand that the claims of the patents-in-suit are directed to specific improvements for digital image processing of images captured by a digital camera.

VI. CLAIMS FOR PATENT INFRINGEMENT

65. The allegations provided below are exemplary and without prejudice to Plaintiff's infringement contentions provided pursuant to the Court's scheduling order and local rules. Plaintiff's claim construction contentions regarding the meaning and scope of the claim terms will be provided under the Court's scheduling order and local rules. As detailed below, each element of at least one claim of each

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[23] https://www.apple.com/newsroom/2021/09/apple-introduces-iphone-13-and-iphone-13-mini/.

[24] https://www.phonearena.com/news/What-is-sensor-shift-stabilization-vs-OIS_id133572.

of the patents-in-suit is literally present in the accused products.[25] To the extent that any element is not literally present, each such element is present under the doctrine of equivalents. Plaintiff's analysis below should not be taken as an admission that the preamble for any claim is limiting. While publicly available information is cited below, Plaintiff may rely on other forms of evidence to show infringement.

66. Identification of the accused products, and the full recital of asserted clams, will be provided in plaintiff's infringement contentions pursuant to the Court's scheduling order and local rules. Apple imports into the United States, uses, makes, offers for sale, and sells in the United States the Accused Products and infringes the asserted claims of the patents-in-suit.

67. For each patent-in-suit, Clear Imaging is entitled to pre-suit damages for Apple's infringement which includes damages from at least the date of issuance of each of the patents-in-suit, for a period of up to six years prior to the filing of the suit, in accord with 35 U.S.C. § 286. Further, there is no failure under 35 U.S.C. § 287 that would limit or otherwise inhibit pre-suit damages. Clear Imaging is further entitled to post-suit damages for Apple's infringement after the filing of this lawsuit. Plaintiff is entitled to damages under 35 U.S.C. § 284.

COUNT I: PATENT INFRINGEMENT OF THE '450 PATENT

68. Clear Imaging incorporates by reference the preceding paragraphs as if fully stated herein.

69. Apple has been and is now directly infringing and/or indirectly infringing the '450 patent by way of inducement, literally and/or under the Doctrine of Equivalents, in violation of 35 U.S.C. § 271, including by making, using, selling, and/or offering for sale in the United States or importing into the United States

[25] Clear Imaging will provide a complete list of asserted claims with its infringement contentions.

infringing products, including each of the '450 accused products.[26] Apple derives revenue from the activities relating to the '450 accused products. As explained below, these products are covered by at least one or more of the '450 patent asserted claims, including, but not limited to, claim 14.

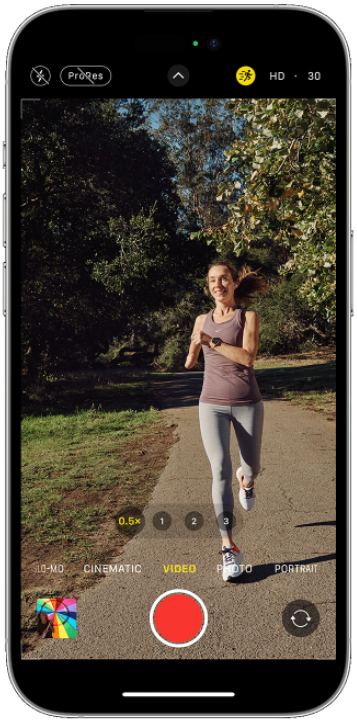
70. Claim 14 of the '450 patent recites an "imaging device" comprising "an image sensor configured to capture a sequence of images, wherein the sequence of images comprise a video, and store the images in a memory."[27] The '450 accused products include an image sensor configured to capture a sequence of images, wherein the sequence of images comprise a video, and store the images in a memory. For example, Apple's website and industry websites show that the '450 accused products include an image sensor and are configured to capture a sequence of images comprising a video and store the images in a memory, as shown by the exemplary evidence below.

[26] The '450 accused products include at least each of the Accused iPhones, the iPad Pro 11-inch (all generations), and iPad Pro 12.9 inch (at least 2nd generation and later), iPad Air (at least 4th generation and later), iPad mini (at least 5th generation and later), and iPad (at least 9th generation and later).

[27] The Apple devices satisfy the preambles as noted throughout this complaint. Clear Imaging reserves the right to assert that the preamble of any asserted claim of any asserted patent is not limiting.

Apple Special Event 2014 - iPhone 6 & iPhone 6 Plus Introduction

"Here's another great feature. Cinematic video stabilization…The person taking the [photo] is also riding on a bike and the video is automatically being stabilized. It's really great.
https://www.youtube.com/watch?v=0T2HCbv9FBQ



Capture steadier video with Action mode

With Action mode on iPhone 14 and iPhone 14 Pro models, you can capture smooth hand-held video even when you're moving around a lot.

1. Open the Camera app and swipe to Video mode.
2. Tap the button to turn on Action mode.
3. Tap the Shutter button and record your video.

Action mode works best with lots of light, and the Camera will show "More light required" if things are too dark. You can change your settings to use Action mode in lower light.

1. In the Settings app, tap Camera.
2. Tap Record Video.
3. Turn on Action Mode Lower Light.

Action mode can capture video at either 1080p or 2.8k resolution up to 60 frames per second. It supports Dolby Vision HDR or, on iPhone 14 Pro models, Apple ProRes video formats.

https://support.apple.com/en-us/HT210571

Apple – September Event 2016

https://www.youtube.com/watch?v=NS0txu_Kzl8&t=482s

Step 1 iPhone 7 Teardown

Edit

- Let's get into this iPhone 7! Before diving in, here are the tech specs:
  - Apple A10 Fusion processor with embedded M10 motion coprocessor
  - 32, 128, or 256 GB onboard storage capacity
  - 4.7-inch IPS multitouch Retina HD display with 1334 × 750 pixels (326 ppi)
  - 12 MP camera with ƒ/1.8 aperture, optical image stabilization, and 5x digital zoom
  - 7 MP FaceTime HD camera with ƒ/2.2 aperture and 1080p HD recording capability
  - Non-mechanical Touch ID home button driven by new Taptic Engine
  - 802.11a/b/g/n/ac Wi-Fi + MIMO Bluetooth 4.2 + NFC

https://www.ifixit.com/Teardown/iPhone+7+Teardown/67382

The left and right sides of the sensor get cropped. The iPhone 6 and 6 Plus share the same 8-megapixel image sensor, and the new iPhone 6s and 6s Plus both use a 12-megapixel image sensor. The extra resolution is required for 4K video—in the case of the iPhone's 4K capture mode, the top and bottom of the frame are cut off, as opposed to the S6 which uses its entire sensor to capture 4K footage. The iPhone 6's video recording tops out at 1080p.

https://www.pcmag.com/news/iphone-6s-vs-iphone-6-and-galaxy-s6-camera-shootout

Apple – September Event 2016
https://www.youtube.com/watch?v=NS0txu_Kzl8&t=482s

4:35-4:45 "Live photos…Now we apply video image stabilization when you take a live photo…"
https://www.youtube.com/watch?v=7ICPvlyfR5o

71. Claim 14 of the '450 patent recites an "imaging device" comprising "one or more motion sensors configured to detect motion information for one or more images of the sequence of images, wherein the motion information represents motion of the imaging device during capturing of the one or more images of the sequence of images, and store the motion information in the memory synchronously with the storing of the one or more images." The '450 accused products include one or more motion sensors configured to detect motion information for one or more images of the sequence of images, wherein the motion information represents motion of the imaging device during capturing of the one or more images of the sequence of images, and store the motion information in the memory synchronously with the storing of the one or more images. For example, Apple's website and industry websites indicate that Apple's devices, including those equipped with video stabilization (including Cinematic Video Stabilization, Action Mode, and/or Video Image Stabilization),[28] include motion sensors configured to detect motion

[28] To the extent Slo-Mo Mode, Time-Lapse Stabilization, and Live Photos use Apple's video stabilization (including Cinematic Video Stabilization and/or Video

information for one or more images of the sequence of images and further that Apple's devices are configured to store the motion information synchronously with the storing of the one or more images.

Sensors

- Touch ID
- Barometer
- Three-axis gyro
- Accelerometer
- Proximity sensor
- Ambient light sensor

https://support.apple.com/kb/SP705?locale=en_US (iPhone 6).

Apple Special Event 2014 - iPhone 6 & iPhone 6 Plus Introduction

"Along with the A8 is our motion coprocessor, a new generation M8. As you know this motion coprocessor works along with offloading the work from your processor with all those ***great sensors on your phone, the accelerometer, the gyroscope***, the compass…"

https://www.youtube.com/watch?v=0T2HCbv9FBQ (at 19:00-19:40)[29]

Image Stabilization) or similar gyro-based video stabilization technology that determines or calculates shifts, they are also accused features for the '450 and '689 patents.

[29] *See also* Apple U.S. Patent No. 8,913,140 ("Rolling Shutter Reduction Based on Motion Sensors"), Col. 1:59-2:20; 16:37-57, Claim 30, Figs. 11A and 11B.

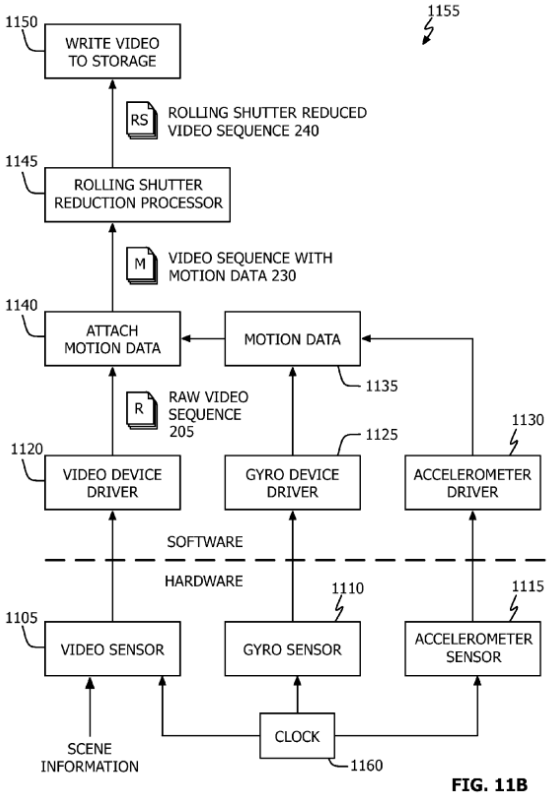


FIG. 11B [30]

Software Stabilization Intended For A Positive Reason?

As we have mentioned before, the software stabilization in iPhone 6 Plus does not fail to reflect an above average outcome. Considering Apple did not enable OIS for video recording, the cinematic video stabilization does its job by a software algorithm. This is the reason the video quality and stabilization differs from viewing it live and then afterwards once you're done.

"iPhone 6 Plus Uses OIS For Images and Software Stabilization For Videos" https://wccftech.com/iphone-6-ois-images-software-stabilzation-videos/

72. Claim 14 of the '450 patent recites an "imaging device" comprising "a processor configured to determine a vertical shift value and a horizontal shift value for one or more images of the sequence of images based at least in part on the motion information" and "modify one or more images of the sequence of images based at least in part on the vertical and the horizontal shift values." The '450 accused

[30] Apple U.S. Patent No. 8,913,140 ("Rolling Shutter Reduction Based on Motion Sensors"), Fig. 11B.

products include a processor configured to determine a vertical shift value and a horizontal shift value for one or more images of the sequence of images based at least in part on the motion information and modify one or more images of the sequence of images based at least in part on the vertical and horizontal shift values. For example, Apple's website and industry websites indicate that Apple's devices, including those equipped with video stabilization (including Cinematic Video Stabilization, Action Mode, and/or Video Image Stabilization), are configured to compensate for vertical shift and horizontal shift detected by motion sensors using motion information stored synchronously with the storing of one or more images, as shown by the evidence cited in the preceding paragraphs. The analysis of Apple's software images for the iPhone which indicates that the AVFoundation Framework includes "GyroVideoStabilization" functionality. Further, Apple's CoreMotion gyro/accelerometer framework provides metadata as an input to Apple's audio/video capture framework.[31] Therefore, on information and belief, motion information is used as part of Apple's digital video stabilization functionality to compensate for vertical shift and horizontal shift detected by motion sensors.

73. Claim 14 of the '450 patent recites an "imaging device" comprising a processor configured to "combine the modified images to obtain a final video" and "wherein the memory is further configured to store the final video." The '450 accused products include a processor configured to combine the modified images to obtain a final video. For example, Apple's website and industry websites explain that Apple's devices include a processor configured to combine the modified images to obtain a final video and a memory to store the final video, as shown, for example, by the evidence cited in the preceding paragraphs and below.

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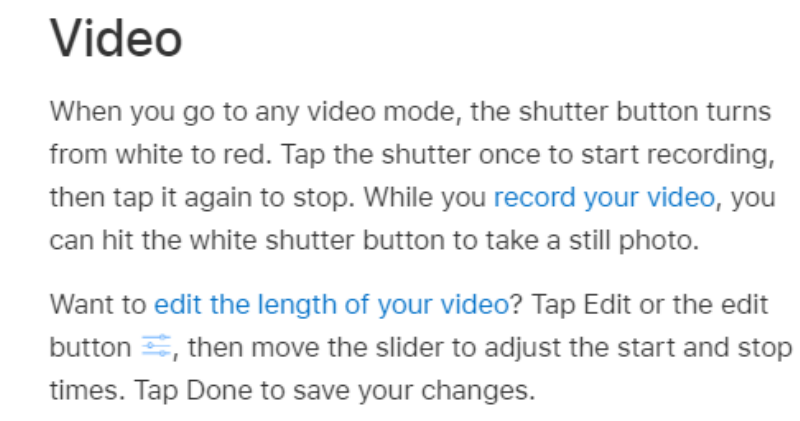
[31] *See, e.g.,* https://developer.limneos.net/index.php?ios=12.1&framework=AVFoundation.framework&header=AVCaptureCoreMotionMetadataInput.h.

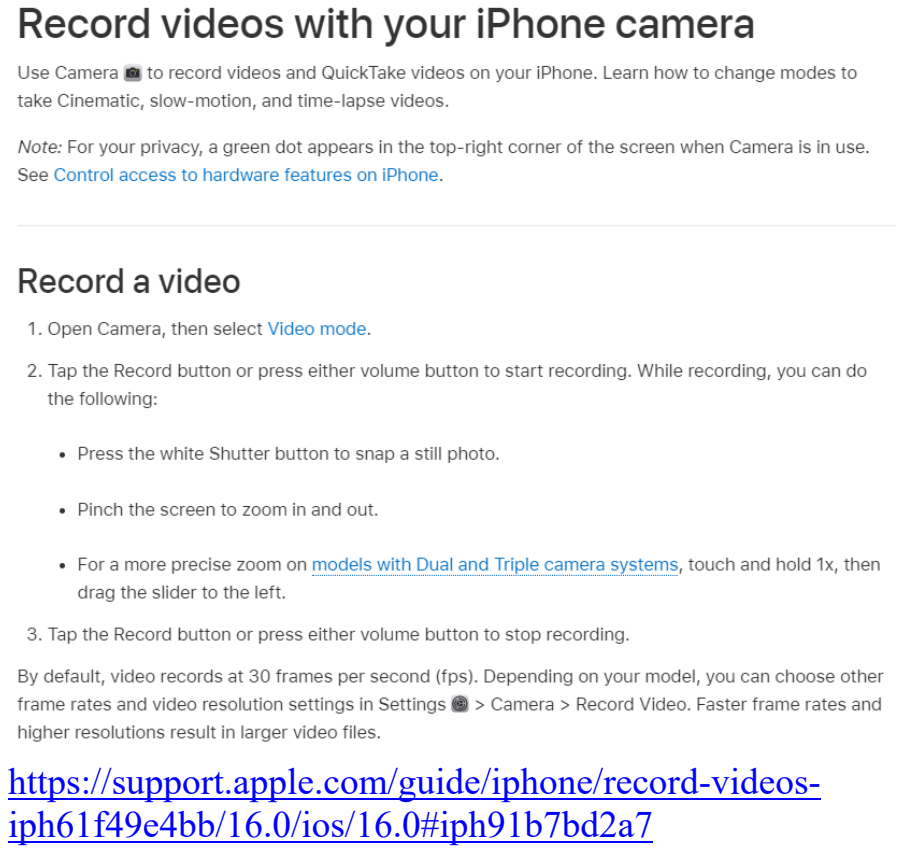


Video

When you go to any video mode, the shutter button turns from white to red. Tap the shutter once to start recording, then tap it again to stop. While you record your video, you can hit the white shutter button to take a still photo.

Want to edit the length of your video? Tap Edit or the edit button, then move the slider to adjust the start and stop times. Tap Done to save your changes.

https://support.apple.com/en-ph/HT207260



Record videos with your iPhone camera

Use Camera to record videos and QuickTake videos on your iPhone. Learn how to change modes to take Cinematic, slow-motion, and time-lapse videos.

Note: For your privacy, a green dot appears in the top-right corner of the screen when Camera is in use. See Control access to hardware features on iPhone.

Record a video

1. Open Camera, then select Video mode.
2. Tap the Record button or press either volume button to start recording. While recording, you can do the following:
   - Press the white Shutter button to snap a still photo.
   - Pinch the screen to zoom in and out.
   - For a more precise zoom on models with Dual and Triple camera systems, touch and hold 1x, then drag the slider to the left.
3. Tap the Record button or press either volume button to stop recording.

By default, video records at 30 frames per second (fps). Depending on your model, you can choose other frame rates and video resolution settings in Settings > Camera > Record Video. Faster frame rates and higher resolutions result in larger video files.

https://support.apple.com/guide/iphone/record-videos-iph61f49e4bb/16.0/ios/16.0#iph91b7bd2a7

74. As described above, Apple has had actual knowledge of the '450 patent, including through claim charts and other information provided by Clear Imaging, and actual knowledge that its activities constitute direct and/or indirect infringement of the '450 patent, yet they have not ceased their infringing activities. *See* Section III. Apple's infringement of the '450 patent has been and continues to be willful and deliberate. Apple also has knowledge of the '450 patent by way of this complaint

and, to the extent they do not cease their infringing activities, their infringement is and continues to be willful and deliberate.

75. Apple actively, knowingly, and intentionally induces infringement of one or more claims of the '450 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import '450 accused products in this judicial district and elsewhere in the United States. For example, Apple actively instructs, promotes, and encourages the use of the infringing features in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.apple.com), press releases, and user manuals, as well as at trade shows (e.g., annual Apple WWDC events) and through its sales and distribution channels that encourage infringing use, sales, offers to sell, and importation of the '450 accused products, as evidenced at least in part by the Apple statements and documents cited in this complaint. Apple user manuals for the '450 accused products instruct, promote, and encourage the use of the camera capability in an infringing manner. In addition, Apple documents and materials for the '450 accused products instruct, promote, and encourage use of video stabilization (including Cinematic Video Stabilization, Action Mode, and/or Video Image Stabilization).

76. Apple, by way of its infringing activities, has caused and continues to cause Plaintiff to suffer damages, the exact amount to be determined at trial.

COUNT II: PATENT INFRINGEMENT OF THE '740 PATENT

77. Clear Imaging incorporates by reference the preceding paragraphs as if fully stated herein.

78. Apple has been and is now directly infringing and/or indirectly infringing the '740 patent by way of inducement, literally and/or under the Doctrine of Equivalents, in violation of 35 U.S.C. § 271, including by making, using, selling, and/or offering for sale in the United States or importing into the United States the

'740 accused products.[32] Apple derives revenue from the activities relating to the '740 accused products. As explained below, these products are covered by at least one or more of the '740 patent asserted claims, including, but not limited to, claim 20.

79. Claim 20 of the '740 patent recites an "imaging device for capturing and processing images" comprising "a user interface configured to display an image, wherein the image is a preview of the field of view of the device, and wherein the image includes a first subject and a second subject" and "a processor configured to receive user input designating the first subject in the image to be kept blur free." The '740 accused products include a user interface configured to display an image, wherein the image is a preview of the field of view of the device, and wherein the image includes a first and second subject. For example, Apple's website shows that the display screen is used as a user interface configured to display an image and to receive a user input that designates a first subject in the image to be kept blur free, as shown in the examples below. The image may also have a second subject as shown below.

[32] On information and belief, Portrait Mode was released with the iPhone 7 Plus and not included in the iPhone 6 models, the iPhone 7, or the iPad Pro 12.9 inch (2nd generation). Under that understanding, the iPhone 6 models, the iPhone 7, and iPad Pro 12.9 inch (2nd generation) are not '740 accused products. On information, all other Accused Products, including all other Accused iPhones and all other Accused iPads, are infringing and are '740 accused products.

Portrait

Portrait mode creates a depth-of-field effect that keeps your subject sharp while blurring the background. You can use Portrait mode on iPhone 7 Plus, iPhone 8 Plus, and later. If you have an iPhone X or later, you can also take a selfie in Portrait mode. You can also use Portrait Mode with the front-facing camera on iPad Pro 11-inch (all generations) and iPad Pro 12.9-inch (3rd generation and later).

To use Portrait mode, open the Camera app and swipe to Portrait mode. Move farther away from your subject if the app suggests it. When the Depth Effect box turns yellow, take the picture.

With iPhone X and later, and iPhone 8 Plus, you can make your Portrait mode images even more captivating with studio-quality lighting effects. After you take your photo, tap Edit and choose from Studio Light, Contour Light, Stage Light, or Stage Light Mono. And with iPhone XS and later, you can create a beautiful, classic look with High-Key Light Mono.

On iPhone XR, the Stage Light, Stage Light Mono, and High-Key Light Mono effects aren't available with the rear-facing camera.

https://support.apple.com/en-us/HT207260

Take Portrait mode photos with your iPhone camera

With Camera on models that support Portrait mode, you can apply a depth-of-field effect that keeps your subject—people, pets, objects, and more—sharp while creating a beautifully blurred foreground and background. You can apply and adjust different lighting effects to your Portrait mode photos, and on iPhone X and later, you can even take a selfie in Portrait mode.

Take a photo in Portrait mode

On iPhone 8 Plus, iPhone X, and later, you can apply studio-quality lighting effects to your Portrait mode photos.

With Portrait mode, the camera creates a depth-of-field effect. This lets you capture photos with a sharp focus on the subject and a blurred background.

Take photos in Portrait mode

1. Open the Camera app and swipe to Portrait mode.
2. Follow the tips on your screen. When Portrait mode is ready, the name of the lighting effect, such as Natural Light, turns yellow.

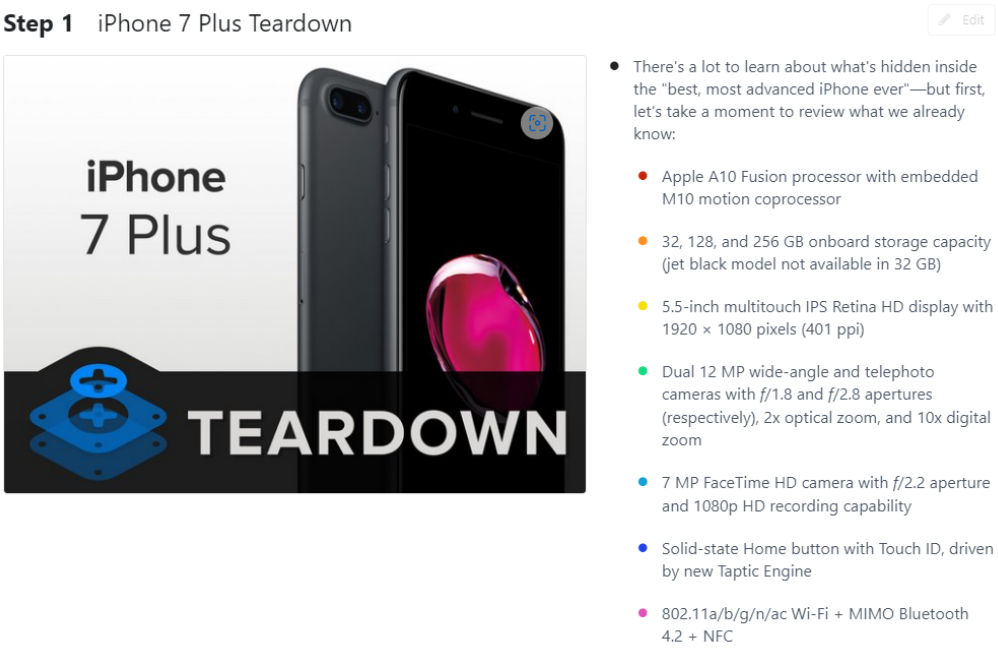
3. Tap the Shutter button.

The Camera app lets you know when you're too close, too far away, or if the area is too dark. You can also use True Tone flash, set a timer, and apply filters. After you take a photo, you can use the built-in editing features to do things like crop and auto-enhance.

Some iPhone models have multiple options for Portrait mode, like 1x or 2x. Just tap the 1x or 2x button to switch between the options. With iPhone XR and iPhone SE (2nd generation), the rear-facing camera must detect a person's face to take a Portrait mode photo.

Portrait mode is available on iPhone SE (2nd generation) and later, iPhone X and later, as well as iPhone 7 Plus and iPhone 8 Plus.

https://support.apple.com/en-us/HT208118



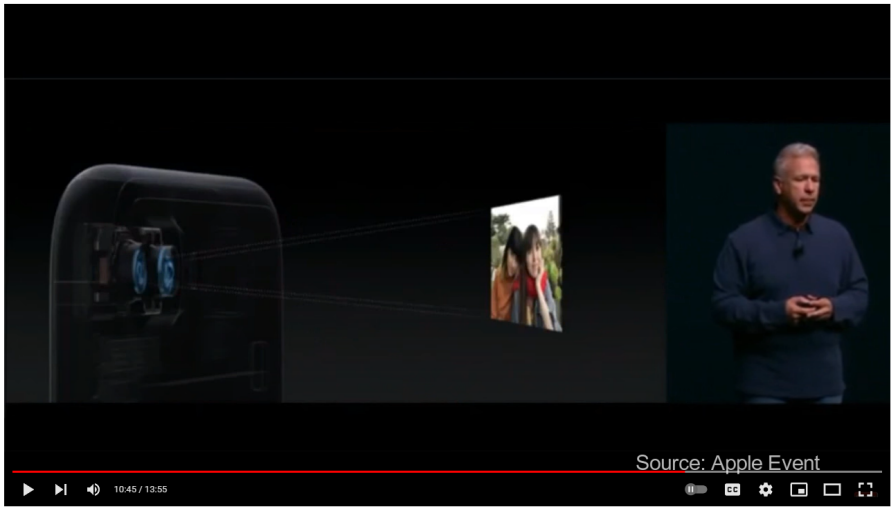
https://www.ifixit.com/Teardown/iPhone+7+Plus+Teardown/67384

Apple – September Event 2016

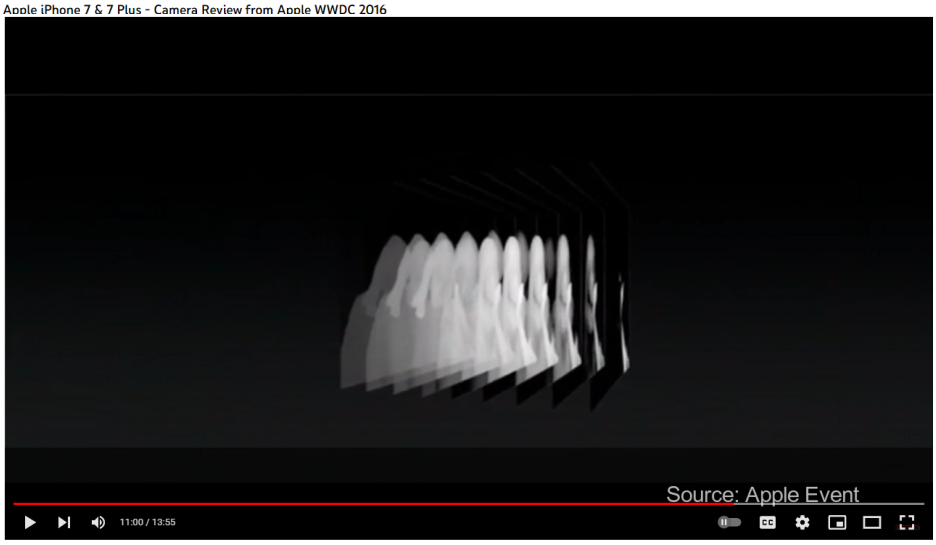
https://www.youtube.com/watch?v=NS0txu_Kzl8&t=482s

80. Claim 20 of the ’740 patent recites an “imaging device” comprising “a memory configured to store a plurality of images captured by the device, wherein the plurality of images include the first subject and the second subject.” The ’740 accused products include a memory configured to store a plurality of images captured by the device, wherein the plurality of images include the first subject and the second subject. For example, Apple’s website and industry websites explain that Apple’s accused products capture a plurality of images including a first subject and a second subject, including through the use of Portrait Mode (including with stand-

alone pictures and Portrait Mode with FaceTime) and Cinematic Mode, as shown in the examples below.



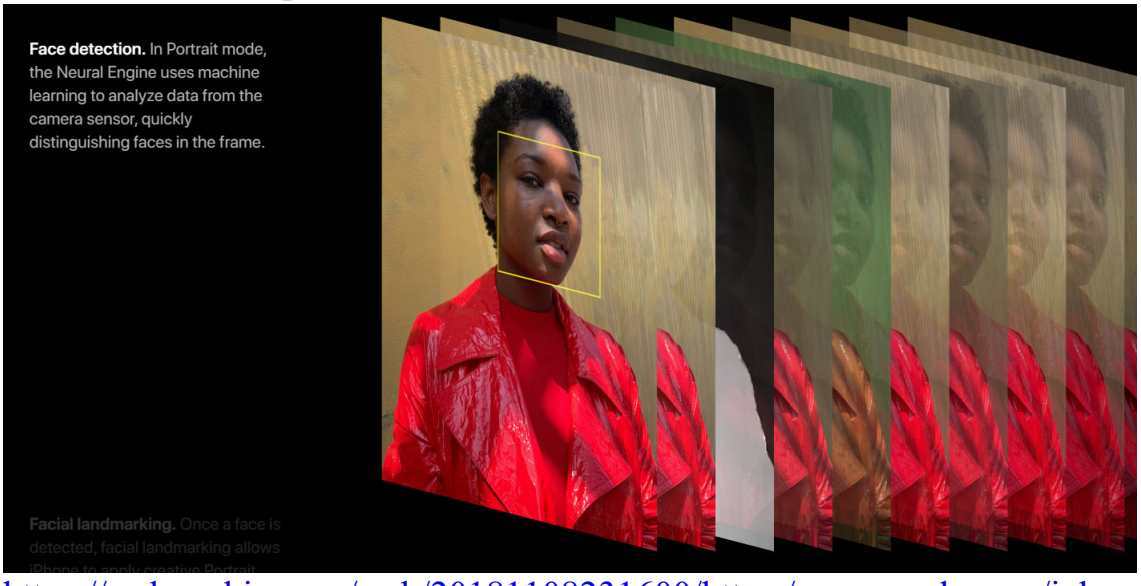
Apple iPhone 7 & 7 Plus - Camera Review from Apple WWDC 2016



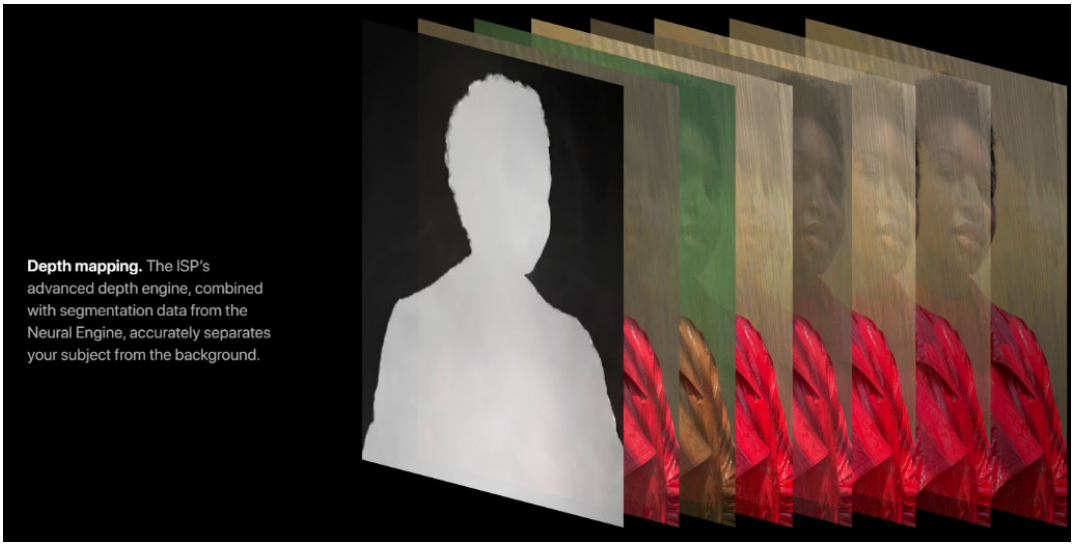
A photo with a clear subject and a beautiful background is "illustrative of a great camera that often has a big sensor like a full-frame sensor or a really big fast lens. And the quality of the background blur, that's what's called Bokeh. And the higher the quality of Bokeh, usually the more advanced the higher quality the lens and camera system. End result is the person is almost popping off the screen. It feels 3-D. **Our goal is to do something like this using the 2 cameras in the iPhone 7 Plus.** What the engineering team has been doing, hardware and software working together, is truly remarkable…**When we take a picture…You use machine learning to recognize people and faces and then create a depth map of that image from the two cameras and the software. Keep the people in the front sharp and focused and apply a beautiful blur to the background.** This is a huge breakthrough in what can be done in smartphone photography…You select

"Portrait" and it automatically jumps to using the telefoto lens. WWDC2016 at 10:15-11:00 https://www.youtube.com/watch?v=7ICPvlyfR5o

81. Claim 20 of the '740 patent recites an "imaging device" comprising a "processor further configured to combine the plurality of images to obtain a combined image, such that: the combined image includes the first subject and the second subject, the first subject in the combined image is blur free, and the second subject in the combined image is blurred compared to the first subject." The '740 accused products include a processor configured to combine the plurality of images to obtain a combined image. For example, Apple's website and industry websites explain that the '740 accused products, including through Portrait Mode (including with stand-alone pictures and Portrait Mode with FaceTime) and Cinematic Mode, create a combined image where a first subject in the combined image is blur free and a second subject in the combined image is blurred compared to the first subject, as shown in the examples below.



https://web.archive.org/web/20181108231600/https:/www.apple.com/iphone-xr/cameras/



https://web.archive.org/web/20181108231600/https:/www.apple.com/iphone-xr/cameras/

"And the second marquee feature is, of course, the Portrait mode, **where the dual camera system locks into the tele camera's narrower field of view, but then uses images from both the wide and the tele to generate a beautiful shallow depth of field effect that you'd expect from a much more expensive camera with a fast, wide-open lens**. The foreground is sharply in focus, while the background is progressively blurred in these pleasing little bouquet circles. The depth effect has gotten even better in iOS 11. We've made improvements to the rendering of the out-of-focus area."

"When **camera one and camera two's images are compared, remember, they line up by optical center and look for features matching key points.** Let's say it's dark out and the observed point may not have very well-defined features anymore, the color is a little bit noisy, the edges are hard to find. Another example would be if you point the cameras at a flax, white wall with no texture to it, there are no features so it's very hard to find differences in matching. For any of these reasons you might have areas in your image where there is no disparity, and those are called holes."

Transcript of WWDC 2017 Presentation Capturing Depth in iPhone Photography[33]

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[33] *See also* Apple WWDC 2017 transcript ("On the most requested developer feature for the dual camera, and that's dual photo capture. What do I mean by this. So far, when you use the dual camera and take a picture, you still just get one image. It's either from the wide or it's from the tele, depending where you're zoomed, or if you're in the area between one and 2X you might get portions of both as we do some

https://web.archive.org/web/20171125053238/https://developer.apple.com/videos/play/wwdc2017/507/

https://web.archive.org/web/20161018181153/https://www.apple.com/iphone-7/[34]

82. Claim 20 of the '740 patent recites an "imaging device" comprising a "user interface further configured to display the combined image." The '740 accused products include a user interface further configured to display the combined image. For example, Apple's website and industry websites explain that Apple's devices include a user interface configured to display the combined image, as shown in the examples below.

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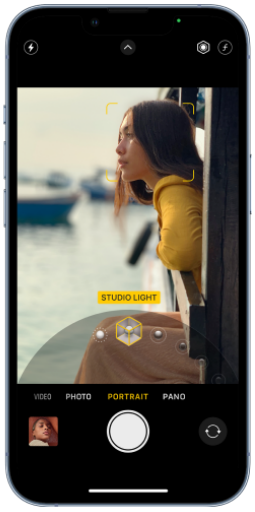
blending to make an even nicer picture, but you still only get one.") http://web.archive.org/web/20220122231207/https://developer.apple.com/videos/play/wwdc2017/507/.

[34] On information and belief, Apple's cameras with Portrait Mode may also use digital image stabilization (including Deep Fusion or Auto-Image Stabilization) which combines multiple images and provides additional acts relevant to infringement of the '740 and '149 patents. Digital image stabilization is discussed in more detail in the context of the '254 patent.

Take a photo in Portrait mode

On iPhone 8 Plus, iPhone X, and later, you can apply studio-quality lighting effects to your Portrait mode photos.



1. Open Camera, then select Portrait mode.
2. Follow the tips onscreen to frame your subject in the yellow portrait box.

https://support.apple.com/guide/iphone/take-portrait-mode-photos-iphd7d3a91a2/ios#:~:text=1%20Open%20Camera%2C%20then%20select%20Portrait%20mode.%202,Tap%20the%20Shutter%20button%20to%20take%20the%20shot.

83. Claim 20 of the '740 patent recites an "imaging device" comprising "a memory configured to store the combined image." The '740 accused products include a memory configured to store the combined image. For example, Apple's website shows that the combined image can be saved to memory, as shown by the evidence in the preceding paragraphs and below.

Step 1 iPhone 7 Plus Teardown

- There's a lot to learn about what's hidden inside the "best, most advanced iPhone ever"—but first, let's take a moment to review what we already know:
- Apple A10 Fusion processor with embedded M10 motion coprocessor
- 32, 128, and 256 GB onboard storage capacity (jet black model not available in 32 GB)
- 5.5-inch multitouch IPS Retina HD display with 1920 × 1080 pixels (401 ppi)
- Dual 12 MP wide-angle and telephoto cameras with *f*/1.8 and *f*/2.8 apertures (respectively), 2x optical zoom, and 10x digital zoom
- 7 MP FaceTime HD camera with *f*/2.2 aperture and 1080p HD recording capability
- Solid-state Home button with Touch ID, driven by new Taptic Engine
- 802.11a/b/g/n/ac Wi-Fi + MIMO Bluetooth 4.2 + NFC

https://www.ifixit.com/Teardown/iPhone+7+Plus+Teardown/67384

Capacity[6]

128GB	128GB	128GB
256GB	256GB	256GB
512GB	512GB	512GB
1TB	1TB	

https://www.apple.com/iphone/compare/

84. As described above, Apple has had actual knowledge of the '740 patent, including through claim charts and other information provided by Clear Imaging, and actual knowledge that its activities constitute direct and/or indirect infringement of the '740 patent, yet they have not ceased their infringing activities. *See* Section

III. Apple's infringement of the '740 patent has been and continues to be willful and deliberate. Apple also has knowledge of the '740 patent by way of this complaint and, to the extent they do not cease their infringing activities, their infringement is and continues to be willful and deliberate.

85. Apple actively, knowingly, and intentionally induces infringement of one or more claims of the '740 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import '740 accused products in this judicial district and elsewhere in the United States. For example, Apple actively instructs, promotes, and encourages the use of the infringing features in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.apple.com), press releases, and user manuals, as well as at trade shows (e.g., annual Apple WWDC events) and through its sales and distribution channels that encourage infringing use, sales, offers to sell, and importation of the '740 accused products, as evidenced at least in part by the Apple statements and documents cited in this complaint. Apple user manuals for the '740 accused products instruct, promote, and encourage the use of the camera capability in an infringing manner. In addition, Apple documents and materials for the '740 accused products instruct, promote, and encourage use of Portrait Mode (including with stand-alone pictures and Portrait Mode with FaceTime) and Cinematic Mode.

86. Apple, by way of its infringing activities, has caused and continues to cause Plaintiff to suffer damages, the exact amount to be determined at trial.

COUNT III: PATENT INFRINGEMENT OF THE '689 PATENT

87. Clear Imaging incorporates by reference the preceding paragraphs as if fully stated herein.

88. Apple has been and is now directly infringing and/or indirectly infringing the '689 patent by way of inducement, literally and/or under the Doctrine of Equivalents, in violation of 35 U.S.C. § 271, including by making, using, selling,

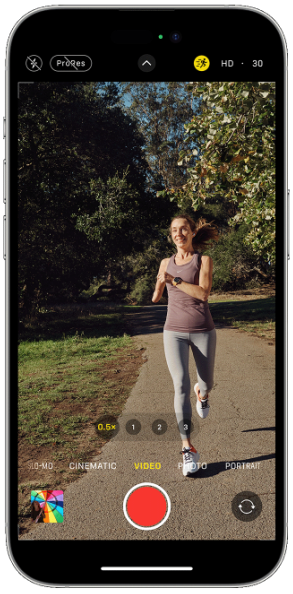
and/or offering for sale in the United States or importing into the United States infringing products, including each of the '689 accused products. Apple derives revenue from the activities relating to the '689 accused products.[35] As explained below, these products are covered by at least one or more of the '689 patent asserted claims, including, but not limited to, claim 1.

89. Claim 1 of the '689 patent recites an "imaging apparatus for capturing stabilized digital video" comprising "a user interface for displaying a preview of the field of view of the imaging apparatus and to receive user input," "an image sensor for capturing digital video data for a video, wherein the video comprises a sequence of images," "one or more motion sensors for detecting motion of the apparatus during capturing of the video data and generating motion data representing the motion of the apparatus." The '689 accused products include a user interface, an image sensor configured to capture a sequence of images, wherein the sequence of images comprise a video, and motion sensors. For example, Apple's website and industry websites show that the '689 accused products are configured to capture a sequence of images comprising a video and include these components.

Apple Special Event 2014 - iPhone 6 & iPhone 6 Plus Introduction

[35] The '689 accused products are the same as the '450 accused products.

"Here's another great feature. Cinematic video stabilization…The person taking the [photo] is also riding on a bike and the video is automatically being stabilized. It's really great.
https://www.youtube.com/watch?v=0T2HCbv9FBQ



Capture steadier video with Action mode

With Action mode on iPhone 14 and iPhone 14 Pro models, you can capture smooth hand-held video even when you're moving around a lot.

1. Open the Camera app and swipe to Video mode.
2. Tap the button to turn on Action mode.
3. Tap the Shutter button and record your video.

Action mode works best with lots of light, and the Camera will show "More light required" if things are too dark. You can change your settings to use Action mode in lower light.

1. In the Settings app, tap Camera.
2. Tap Record Video.
3. Turn on Action Mode Lower Light.

Action mode can capture video at either 1080p or 2.8k resolution up to 60 frames per second. It supports Dolby Vision HDR or, on iPhone 14 Pro models, Apple ProRes video formats.

https://support.apple.com/en-us/HT210571

Step 1 iPhone 7 Teardown

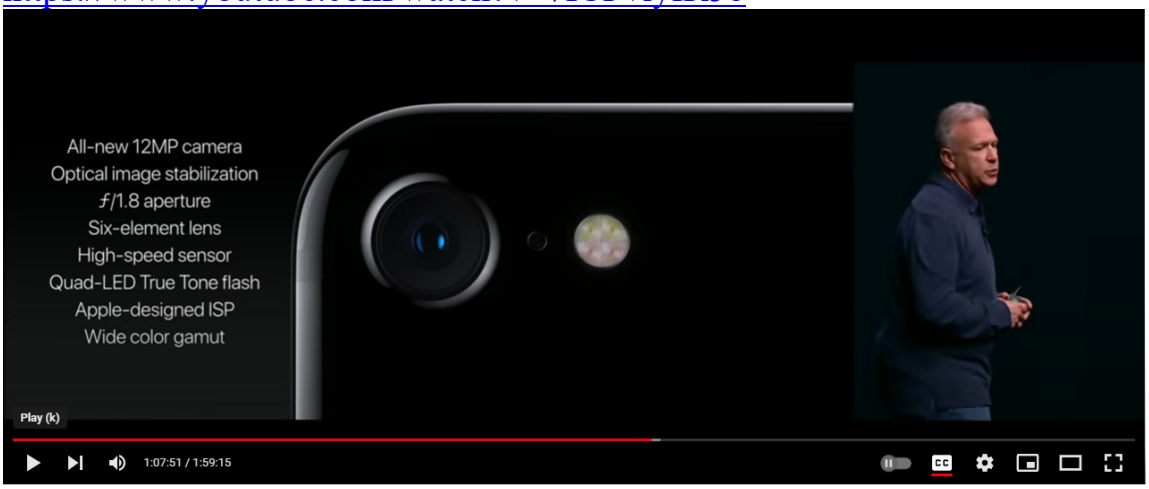
Edit

- Let's get into this iPhone 7! Before diving in, here are the tech specs:
  - Apple A10 Fusion processor with embedded M10 motion coprocessor
  - 32, 128, or 256 GB onboard storage capacity
  - 4.7-inch IPS multitouch Retina HD display with 1334 × 750 pixels (326 ppi)
  - 12 MP camera with *f*/1.8 aperture, optical image stabilization, and 5x digital zoom
  - 7 MP FaceTime HD camera with *f*/2.2 aperture and 1080p HD recording capability
  - Non-mechanical Touch ID home button driven by new Taptic Engine
  - 802.11a/b/g/n/ac Wi-Fi + MIMO Bluetooth 4.2 + NFC

https://www.ifixit.com/Teardown/iPhone+7+Teardown/67382

Apple – September Event 2016
https://www.youtube.com/watch?v=NS0txu_Kzl8&t=482s

4:35-4:45 "Live photos…Now we apply video image stabilization when you take a live photo…"
https://www.youtube.com/watch?v=7ICPvlyfR5o



Apple – September Event 2016
https://www.youtube.com/watch?v=NS0txu_Kzl8&t=482s

Sensors

- Touch ID
- Barometer
- Three-axis gyro
- Accelerometer
- Proximity sensor
- Ambient light sensor

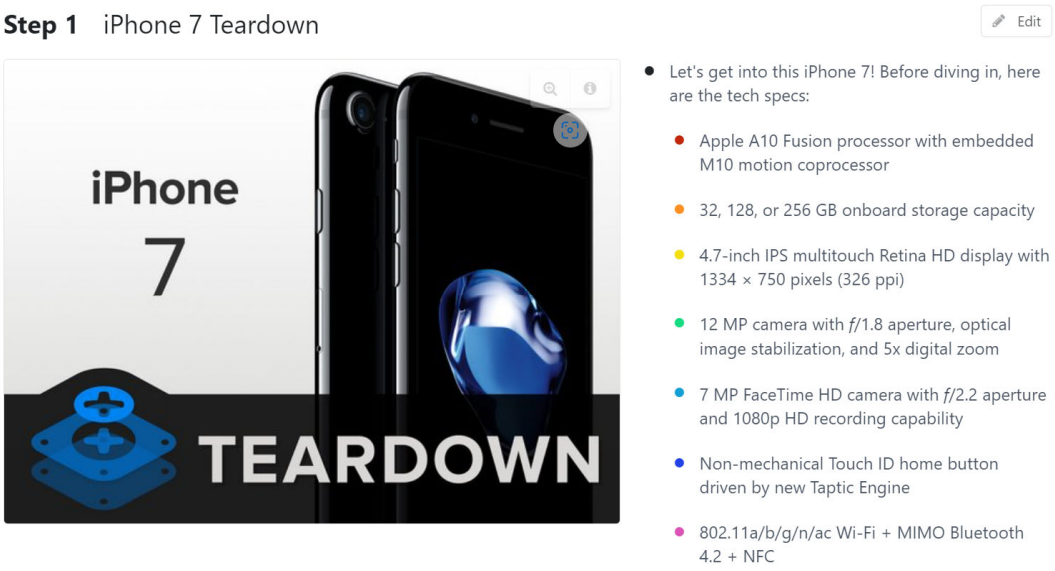
https://support.apple.com/kb/SP705?locale=en_US (iPhone 6).

90. Claim 1 of the '689 patent recites a "lens comprising one or more lens elements, wherein the one or more lens elements include at least one movable lens element that is movable relative to the imaging apparatus," and a "video image

processor communicatively connected to the image sensor and the motion sensors to receive the video data and the motion data, the processor configured to." The '689 accused products recite a "lens comprising one or more lens elements, wherein the one or more lens elements include at least one movable lens element that is movable relative to the imaging apparatus," and a "video image processor communicatively connected to the image sensor and the motion sensors to receive the video data and the motion data, the processor configured to." For example, Apple's website and industry websites show that the '689 accused products are configured to capture a sequence of images comprising a video and include these components.

31:22-32:06 "iPhone 6 has digital image stabilization. So it can try to help compensate if your hands not holding the phone steady…it can try to help it not be blurry. iPhone 6+ adds Optical Image Stabilization….**Now the lens can move up and down and side to side**…We combine that with the new gyroscope to automatically adjust the stabilizer image when taking a photo."

https://www.bing.com/videos/search?q=Apple+WWDC+2015+and+camera&&view=detail&mid=5C3C65F27495A97E49905C3C65F27495A97E4990&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3DApple%2BWWDC%2B2015%2Band%2Bcamera%26FORM%3DHDRSC



https://www.ifixit.com/Teardown/iPhone+7+Teardown/67382

Apple – September Event 2016

https://www.youtube.com/watch?v=NS0txu_Kzl8&t=482s

91. Claim 1 of the ’689 patent recites “calculate shift amounts for the sequence of images based at least in part on the motion data generated by the motion sensors” and “modify the sequence of images using the calculated shift amounts.” The ’689 accused products calculate shift amounts for the sequence of images based at least in part on the motion data generated by the motion sensors and modify the sequency of images using the calculated shift amounts. For example, Apple’s website and industry websites indicate that Apple’s devices, including those equipped with video stabilization (including Cinematic Video Stabilization, Action Mode, and/or Video Image Stabilization), include motion sensors configured to

detect motion information for one or more images of the sequence of images, calculate shift amounts, and modify the sequence of images using the calculated shift amounts as recited in the claim as shown by the evidence in the preceding paragraphs and below. The analysis of Apple's software images for the iPhone which indicates that the AVFoundation Framework includes "GyroVideoStabilization" functionality. Further, Apple's CoreMotion gyro/accelerometer framework provides metadata as an input to Apple's audio/video capture framework.[36] Therefore, on information and belief, motion information is used as part of Apple's digital video stabilization functionality.

Apple Special Event 2014 - iPhone 6 & iPhone 6 Plus Introduction

"Along with the A8 is our motion coprocessor, a new generation M8. As you know this motion coprocessor works along with offloading the work from your processor with all those great sensors on your phone, the accelerometer, the gyroscope, the compass…"

https://www.youtube.com/watch?v=0T2HCbv9FBQ (19:00-19:40)

[36] *See* https://developer.limneos.net/index.php?ios=12.1&framework=AVFoundation.framework&header=AVCaptureCoreMotionMetadataInput.h.

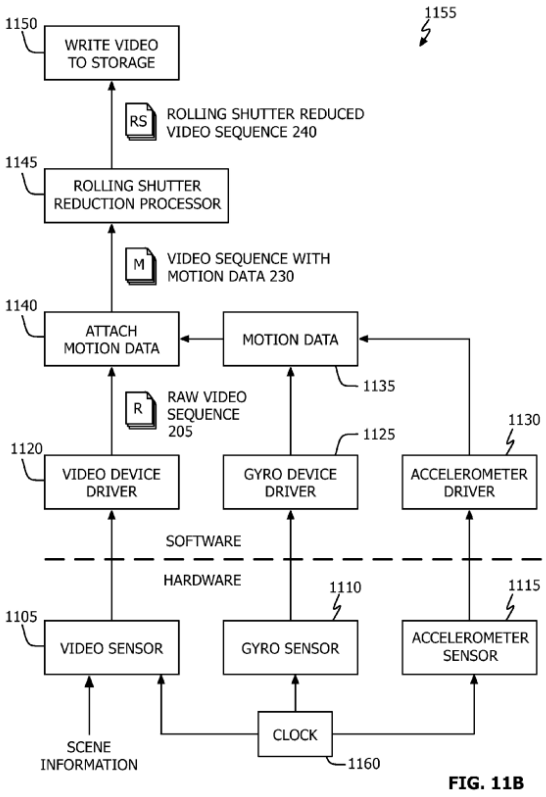


FIG. 11B

Apple U.S. Patent No. 8,913,140 ("Rolling Shutter Reduction Based on Motion Sensors"), Fig. 11B

Software Stabilization Intended For A Positive Reason?

As we have mentioned before, the software stabilization in iPhone 6 Plus does not fail to reflect an above average outcome. Considering Apple did not enable OIS for video recording, the cinematic video stabilization does its job by a software algorithm. This is the reason the video quality and stabilization differs from viewing it live and then afterwards once you're done.

"iPhone 6 Plus Uses OIS For Images and Software Stabilization For Videos" https://wccftech.com/iphone-6-ois-images-software-stabilzation-videos/

92. Claim 1 of the '689 patent recites "combine the modified sequence of images to obtain a stabilized video" and a "memory connected to the video image processor for storing the stabilized video." For example, Apple's website and industry websites indicate that Apple's devices, including those equipped with video stabilization (including Cinematic Video Stabilization, Action Mode, and/or Video Image Stabilization), are configured to combine the modified sequence of images to

obtain a stabilized video and have a memory connected to the video image processor for storing the stabilized video. For example, Apple's website and industry websites explain that Apple's devices include a processor configured to combine the modified images to obtain a final video and a memory to store the final video, as shown by the evidence cited in the preceding paragraph and the evidence below

Video

When you go to any video mode, the shutter button turns from white to red. Tap the shutter once to start recording, then tap it again to stop. While you record your video, you can hit the white shutter button to take a still photo.

Want to edit the length of your video? Tap Edit or the edit button, then move the slider to adjust the start and stop times. Tap Done to save your changes.

https://support.apple.com/en-ph/HT207260

Record videos with your iPhone camera

Use Camera to record videos and QuickTake videos on your iPhone. Learn how to change modes to take Cinematic, slow-motion, and time-lapse videos.

Note: For your privacy, a green dot appears in the top-right corner of the screen when Camera is in use. See Control access to hardware features on iPhone.

Record a video

1. Open Camera, then select Video mode.
2. Tap the Record button or press either volume button to start recording. While recording, you can do the following:
   - Press the white Shutter button to snap a still photo.
   - Pinch the screen to zoom in and out.
   - For a more precise zoom on models with Dual and Triple camera systems, touch and hold 1x, then drag the slider to the left.
3. Tap the Record button or press either volume button to stop recording.

By default, video records at 30 frames per second (fps). Depending on your model, you can choose other frame rates and video resolution settings in Settings > Camera > Record Video. Faster frame rates and higher resolutions result in larger video files.

https://support.apple.com/guide/iphone/record-videos-iph61f49e4bb/16.0/ios/16.0#iph91b7bd2a7

93. As described above, Apple has had actual knowledge of the '689 patent, including through claim charts and other information provided by Clear Imaging, and actual knowledge that its activities constitute direct and/or indirect infringement of the '689 patent, yet they have not ceased their infringing activities. *See* Section III. Apple's infringement of the '689 patent has been and continues to be willful and deliberate. Apple also has knowledge of the '689 patent by way of this complaint and, to the extent they do not cease their infringing activities, their infringement is and continues to be willful and deliberate.

94. Apple actively, knowingly, and intentionally induces infringement of one or more claims of the '689 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import '689 accused products in this judicial district and elsewhere in the United States. For example, Apple actively instructs, promotes, and encourages the use of the infringing features in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.apple.com), press releases, and user manuals, as well as at trade shows (e.g., annual Apple WWDC events) and through its sales and distribution channels that encourage infringing use, sales, offers to sell, and importation of the '689 accused products, as evidenced at least in part by the Apple statements and documents cited in this complaint. Apple user manuals for the '689 accused products instruct, promote, and encourage the use of the camera capability in an infringing manner. In addition, Apple documents and materials for the '689 accused products instruct, promote, and encourage use of video stabilization (including Cinematic Video Stabilization, Action Mode, and/or Video Image Stabilization).

95. Apple, by way of its infringing activities, has caused and continues to cause Plaintiff to suffer damages, the exact amount to be determined at trial.

COUNT IV: PATENT INFRINGEMENT OF THE '149 PATENT

96. Clear Imaging incorporates by reference the preceding paragraphs as if fully stated herein.

97. Apple has been and is now directly infringing and/or indirectly infringing the '149 patent by way of inducement, literally and/or under the Doctrine of Equivalents, in violation of 35 U.S.C. § 271, including by making, using, selling, and/or offering for sale in the United States or importing into the United States the '149 accused products.[37] Apple derives revenue from the activities relating to the '149 accused products. As explained below, these products are covered by at least one or more of the '149 patent asserted claims, including, but not limited to, claim 21.

98. Claim 21 of the '149 patent recites an "imaging apparatus for capturing and processing digital images, comprising," "a user interface for displaying a preview of a field of view of the imaging apparatus, for receiving a user input, and for displaying a final image," "a camera comprising a lens having a focal length, wherein the lens has one or more lens elements, and an image sensor optically coupled to the lens for capturing digital images," as shown by the exemplary evidence below.

[37] The '149 accused products are the same as the '740 accused products.

Take Portrait mode photos with your iPhone camera

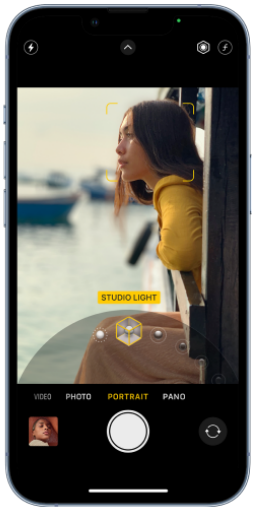
With Camera on models that support Portrait mode, you can apply a depth-of-field effect that keeps your subject—people, pets, objects, and more—sharp while creating a beautifully blurred foreground and background. You can apply and adjust different lighting effects to your Portrait mode photos, and on iPhone X and later, you can even take a selfie in Portrait mode.

Take a photo in Portrait mode

On iPhone 8 Plus, iPhone X, and later, you can apply studio-quality lighting effects to your Portrait mode photos.

Take a photo in Portrait mode

On iPhone 8 Plus, iPhone X, and later, you can apply studio-quality lighting effects to your Portrait mode photos.



1. Open Camera, then select Portrait mode.
2. Follow the tips onscreen to frame your subject in the yellow portrait box.

https://support.apple.com/guide/iphone/take-portrait-mode-photos-iphd7d3a91a2/ios#:~:text=1%20Open%20Camera%2C%20then%20select%20Portrait%20mode.%202,Tap%20the%20Shutter%20button%20to%20take%20the%20shot.

Portrait

Portrait mode creates a depth-of-field effect that keeps your subject sharp while blurring the background. You can use Portrait mode on iPhone 7 Plus, iPhone 8 Plus, and later. If you have an iPhone X or later, you can also take a selfie in Portrait mode. You can also use Portrait Mode with the front-facing camera on iPad Pro 11-inch (all generations) and iPad Pro 12.9-inch (3rd generation and later).

To use Portrait mode, open the Camera app and swipe to Portrait mode. Move farther away from your subject if the app suggests it. When the Depth Effect box turns yellow, take the picture.

With iPhone X and later, and iPhone 8 Plus, you can make your Portrait mode images even more captivating with studio-quality lighting effects. After you take your photo, tap Edit and choose from Studio Light, Contour Light, Stage Light, or Stage Light Mono. And with iPhone XS and later, you can create a beautiful, classic look with High-Key Light Mono.

On iPhone XR, the Stage Light, Stage Light Mono, and High-Key Light Mono effects aren't available with the rear-facing camera.

https://support.apple.com/en-us/HT207260

Step 1 iPhone 7 Plus Teardown

- There's a lot to learn about what's hidden inside the "best, most advanced iPhone ever"—but first, let's take a moment to review what we already know:
  - Apple A10 Fusion processor with embedded M10 motion coprocessor
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  - 5.5-inch multitouch IPS Retina HD display with 1920 × 1080 pixels (401 ppi)
  - Dual 12 MP wide-angle and telephoto cameras with *f*/1.8 and *f*/2.8 apertures (respectively), 2x optical zoom, and 10x digital zoom
  - 7 MP FaceTime HD camera with *f*/2.2 aperture and 1080p HD recording capability
  - Solid-state Home button with Touch ID, driven by new Taptic Engine
  - 802.11a/b/g/n/ac Wi-Fi + MIMO Bluetooth 4.2 + NFC

https://www.ifixit.com/Teardown/iPhone+7+Plus+Teardown/67384

Apple – September Event 2016

https://www.youtube.com/watch?v=NS0txu_Kzl8&t=482s

Dual-camera system

12MP Main: 26 mm, ƒ/1.5 aperture, sensor-shift optical image stabilization, seven-element lens, 100% Focus Pixels

https://www.apple.com/iphone-14/specs/

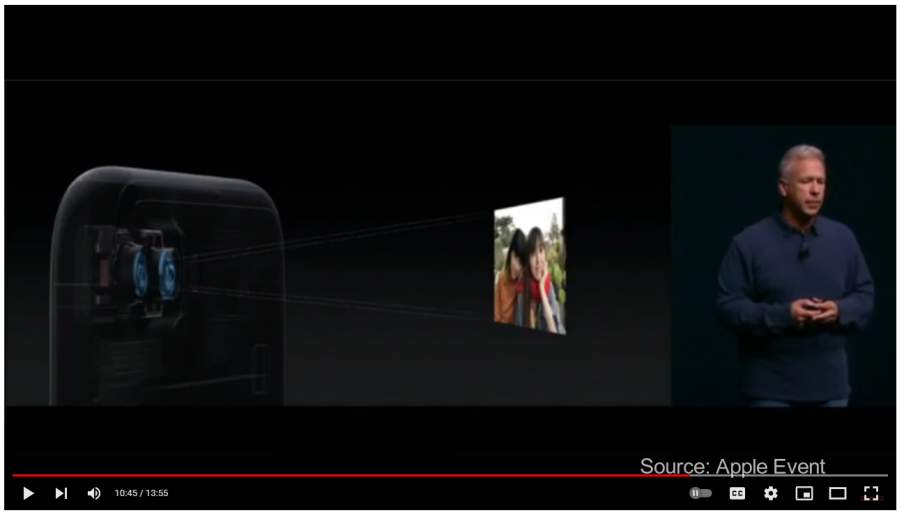
The newest pack of iPhones hit the market with an array of new features, including improved cameras with super-wide and wide-angle lenses and an f/1.6 aperture for a focal length of 26 mm. The iPhone Pro and Pro Max have a three-lens camera system with a 77 mm telephoto lens, a 26 mm wide lens, and a 13 mm ultra-wide lens.

https://opticsmag.com/what-is-iphones-focal-length/#:~:text=The%20iPhone%20has%20a%20focal%20length%20of%2026,Image%20Credit%3A%20Josh%20Power%2C%20Unsplash%202023%20iPhone%20Releases

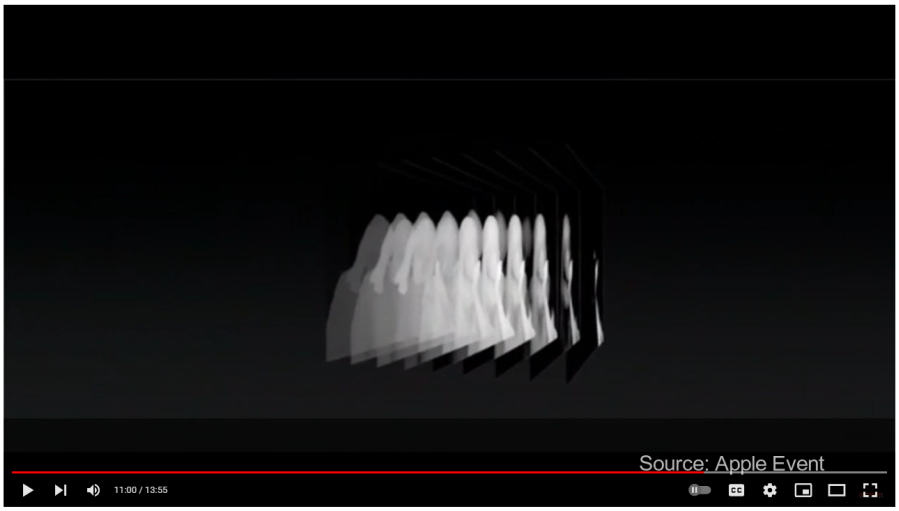
Phone:	iPhone 7 Plus
Wide (main) lens	- 12 MP - Aperture: f/1.8 - Focal length: 28 mm - Pixel size: 1.22 micron - Sensor: 1/3", Apple iSight Camera (BSI CMOS) - Phase autofocus - Optical stabilization
Telephoto lens	- 12 MP - Aperture: f/2.8 - Focal length: 56 mm - Sensor: 1/3.6" (BSI CMOS) - Phase autofocus - Optical stabilization

https://nanoreview.net/en/phone-compare/apple-iphone-7-plus-vs-apple-iphone-13

99. Claim 21 of the '149 patent recites an "imaging apparatus" comprising "a memory for storing digital images and for storing a plurality of instructions for executing on a processor," and "a processor communicatively connected to the memory for receiving the plurality of instructions stored therein, wherein executing the instructions by the processor causes the processor to." The '149 accused products include an imaging apparatus comprising a memory for storing digital images and for storing a plurality of instructions for executing on a processor, and a processor communicatively connected to the memory. For example, Apple's website and industry websites explain that Apple's accused products capture and store a plurality of images, including through the use of Portrait Mode (including with stand-alone pictures and Portrait Mode with FaceTime) and Cinematic Mode, as shown in the examples below.

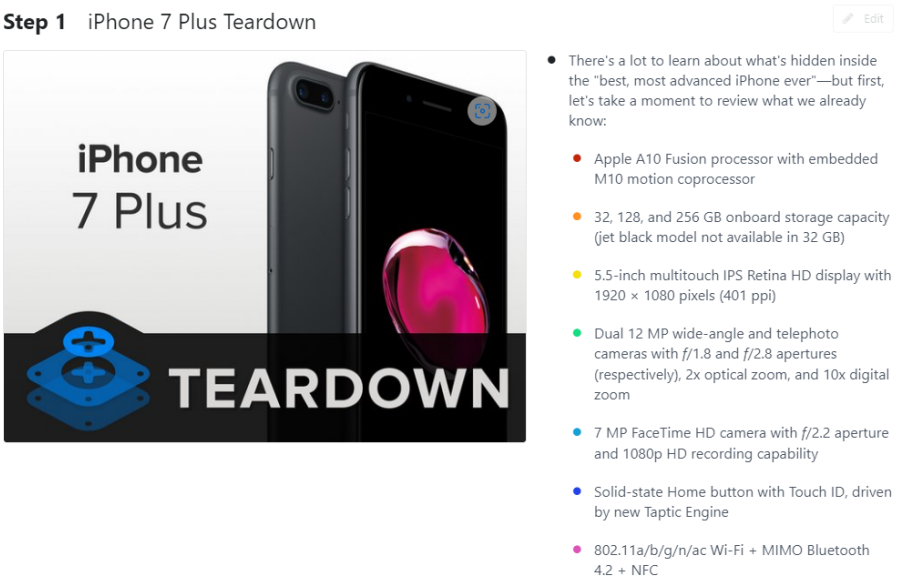


Apple iPhone 7 & 7 Plus - Camera Review from Apple WWDC 2016



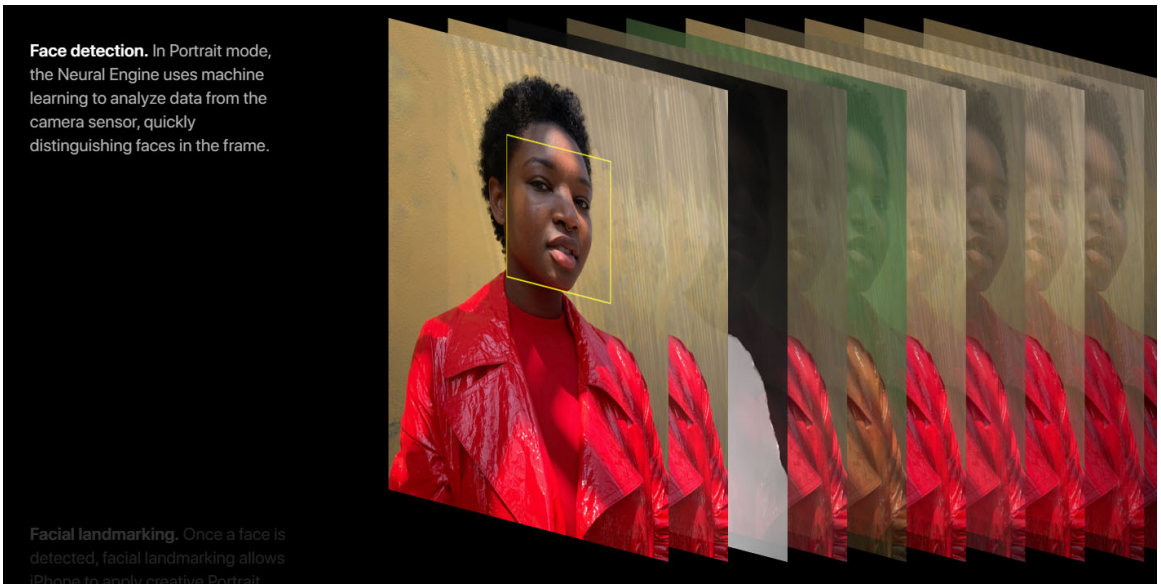
A photo with a clear subject and a beautiful background is "illustrative of a great camera that often has a big sensor like a full-frame sensor or a really big fast lens. And the quality of the background blur, that's what's called Bokeh. And the higher the quality of Bokeh, usually the more advanced the higher quality the lens and camera system. End result is the person is almost popping off the screen. It feels 3-D. **Our goal is to do something like this using the 2 cameras in the iPhone 7 Plus.** What the engineering team has been doing, hardware and software working together, is truly remarkable…When we take a picture…**You use machine learning to recognize people and faces and then create a depth map of that image from the two cameras and the software. Keep the people in the front sharp and focused and apply a beautiful blur to the background.** This is a huge breakthrough in what can be done in smartphone photography…You select "Portrait" and it automatically jumps to using the telefoto lens.

WWDC2016 at 10:15-11:00
https://www.youtube.com/watch?v=7ICPvlyfR5o

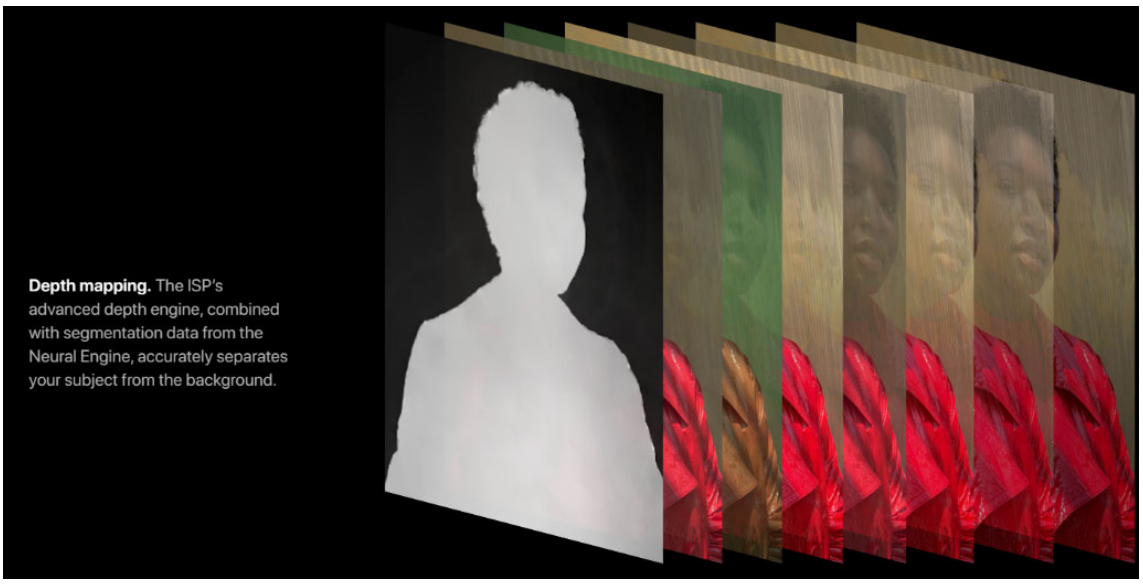


https://www.ifixit.com/Teardown/iPhone+7+Plus+Teardown/67384

100. Claim 21 of the '149 patent recites "receive a sequence of digital images captured by the camera of the imaging apparatus," "process the sequence of digital images to determine a designated subject and a background in the sequence of digital images by taking into account the focal length of the lens," and "generate a final image such that the final image includes the designated subject and the background, wherein the designated subject in the final image is clear and sharp and the background in the final image is blurred." The '149 accused products include a processor configured to receive a sequence of digital images captured by the camera, process the sequence of digital images to determine a designated subject and a background in the sequence of digital images by taking into account the focal length of the lens, and generate a final image that includes the designed subject and background, wherein the designated subject in the final image is clear and sharp and background is blurred. For example, Apple's website and industry websites explain that the '149 accused products, including through Portrait Mode (including with stand-alone pictures and Portrait Mode with FaceTime) and Cinematic Mode, create a final image where a subject in the final image is clear and sharp and a background in the final image is blurred compared to the subject, as shown in the exemplary evidence below.



https://web.archive.org/web/20181108231600/https:/www.apple.com/iphone-xr/cameras/



https://web.archive.org/web/20181108231600/https:/www.apple.com/iphone-xr/cameras/

"And the second marquee feature is, of course, the Portrait mode, where the dual camera system locks into the tele camera's narrower field of view, but then **uses images from both the wide and the tele to generate a beautiful shallow depth of field effect that you'd expect from a much more expensive camera with a fast, wide-open lens**. The foreground is sharply in focus, while the background is progressively blurred in these pleasing little bouquet circles. The depth effect has

gotten even better in iOS 11. We've made improvements to the rendering of the out-of-focus area."

Transcript of WWDC 2017 Presentation Capturing Depth in iPhone Photography

https://web.archive.org/web/20171125053238/https://developer.apple.com/videos/play/wwdc2017/507/

"When **camera one and camera two's images are compared, remember, they line up by optical center and look for features matching key points.** Let's say it's dark out and the observed point may not have very well-defined features anymore, the color is a little bit noisy, the edges are hard to find. Another example would be if you point the cameras at a flax, white wall with no texture to it, there are no features so it's very hard to find differences in matching. For any of these reasons you might have areas in your image where there is no disparity, and those are called holes."

Transcript of WWDC 2017 Presentation Capturing Depth in iPhone Photography

https://web.archive.org/web/20171125053238/https://developer.apple.com/videos/play/wwdc2017/507/

https://web.archive.org/web/20161018181153/https://www.apple.com/iphone-7/[38]

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[38] *See also* Apple WWDC 2017 transcript ("On the most requested developer feature for the dual camera, and that's dual photo capture. What do I mean by this. So far, when you use the dual camera and take a picture, you still just get one image. It's either from the wide or it's from the tele, depending where you're zoomed, or if you're in the area between one and 2X you might get portions of both as we do some blending to make an even nicer picture, but you still only get one.")

> Thank you. First we need to define what a depth map is.
>
> In the real world depth means the distance between you and an observed object.
>
> A depth map is a transformation of a three-dimensional scene into a two-dimensional representation, and you do that by setting the depth to a constant distance.
>
> Let me explain what I mean. I'm going to use a diagram of a pinhole camera often during this presentation. If you've studied computer vision, you'll be really familiar with pinhole cameras. A pinhole camera is a simple lightproof box without a lens. Instead, it just has a little poked hole, a single small aperture that permits light to enter in and project itself as an inverted image on the other side of the image plane, or a sensor. The opposite side is known as image plane or sensor.
>
> The aperture through which the light rays pass is called the focal point, and the field of view of the image captured depends on the focal length. So the focal length is the distance from the focal point to the image plane. A shorter focal length means wider field of view; whereas, longer focal length, longer box, means narrower field of view.

….

> Instead, we at Apple have chosen to express disparity using normalized values that are resilient to scaling operations. So here's how we do that. Again, going to our observed point, you'll notice that there are two similar triangles being formed. I'll highlight them for you.
>
> These triangles have equal ratios of sides and proportions. Now, if I get rid of the cameras to just show you the triangles, the real-world triangle sides are Z, or meters, and baseline, the distance between the two optical centers.
>
> Inside the light box, or the lightproof box, that same triangle is represented as the focal length in pixels and the disparity in pixels. Do you feel math coming on? I feel math coming on. So stay with me here. This is pretty painless.
>
> Baseline is to Z as pixel disparity is to focal length.

….

> When you attach a DepthDataOutput to your session, some things happen. The dual camera automatically zooms to 2X, that is the full field of view of the tele, and that's because in order to calculate disparity, the focal lengths need to be the same and at 2X zoom the wide-angle camera's focal length matches the tele.

WWDC 2017
http://web.archive.org/web/20220122231207/https://developer.apple.com/videos/play/wwdc2017/507/

101. Claim 21 of the ’149 patent recites “store the final image in the memory” and “display the final image in the user interface.” The ’149 accused products include a memory to store the final image and a user interface to display

the final image. For example, Apple's website and industry websites explain that Apple's devices include a memory and user interface configured to display the final image, as shown in the evidence in the preceding paragraphs and the example evidence below.

Take Portrait mode photos with your iPhone camera

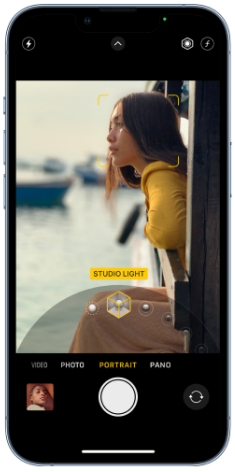
With Camera on models that support Portrait mode, you can apply a depth-of-field effect that keeps your subject—people, pets, objects, and more—sharp while creating a beautifully blurred foreground and background. You can apply and adjust different lighting effects to your Portrait mode photos, and on iPhone X and later, you can even take a selfie in Portrait mode.

Take a photo in Portrait mode

On iPhone 8 Plus, iPhone X, and later, you can apply studio-quality lighting effects to your Portrait mode photos.

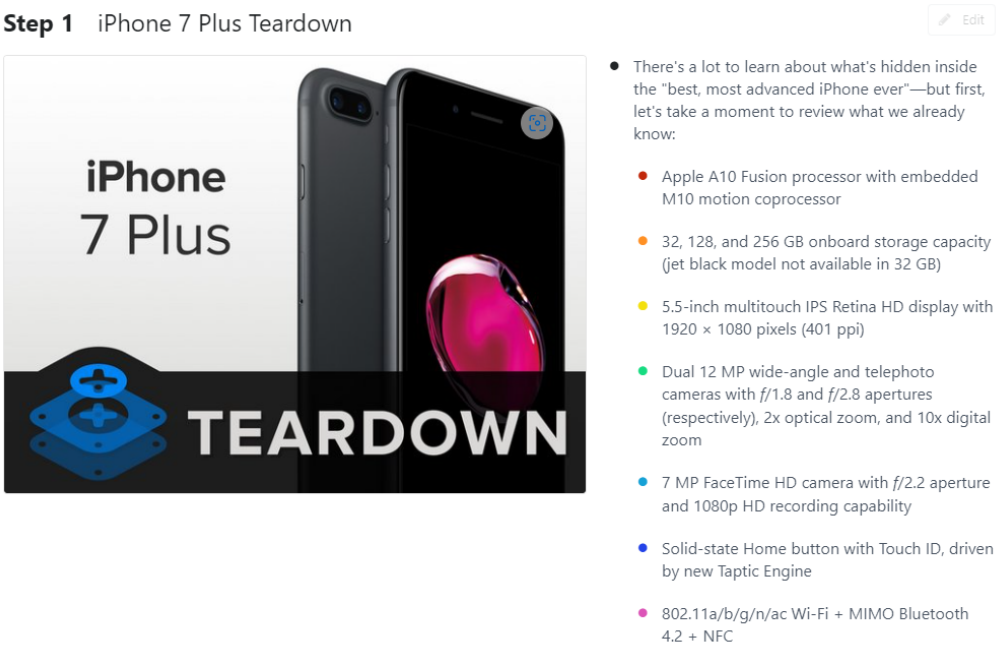
Take a photo in Portrait mode

On iPhone 8 Plus, iPhone X, and later, you can apply studio-quality lighting effects to your Portrait mode photos.



1. Open Camera, then select Portrait mode.
2. Follow the tips onscreen to frame your subject in the yellow portrait box.

https://support.apple.com/guide/iphone/take-portrait-mode-photos-iphd7d3a91a2/ios#:~:text=1%20Open%20Camera%2C%20then%20select%20Portrait%20mode.%202,Tap%20the%20Shutter%20button%20to%20take%20the%20shot.



https://www.ifixit.com/Teardown/iPhone+7+Plus+Teardown/67384

102. As described above, Apple has had actual knowledge of the '149 patent, including through claim charts and other information provided by Clear Imaging, and actual knowledge that its activities constitute direct and/or indirect infringement of the '149 patent, yet they have not ceased their infringing activities. *See* Section III. Apple's infringement of the '149 patent has been and continues to be willful and deliberate. Apple also has knowledge of the '149 patent by way of this complaint and, to the extent they do not cease their infringing activities, their infringement is and continues to be willful and deliberate.

103. Apple actively, knowingly, and intentionally induces infringement of one or more claims of the '149 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import '149 accused products in this judicial district and elsewhere in the United States. For example, Apple actively instructs, promotes, and encourages the use of the infringing features in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.apple.com), press releases, and user manuals, as well as at trade shows (e.g., annual Apple WWDC events) and through its sales and distribution

channels that encourage infringing use, sales, offers to sell, and importation of the '149 accused products, as evidenced at least in part by the Apple statements and documents cited in this complaint. Apple user manuals for the '149 accused products instruct, promote, and encourage the use of the camera capability in an infringing manner. In addition, Apple documents and materials for the '149 accused products instruct, promote, and encourage use of Portrait Mode (including with stand-alone pictures and Portrait Mode with FaceTime) and Cinematic Mode.

104. Apple, by way of its infringing activities, has caused and continues to cause Plaintiff to suffer damages, the exact amount to be determined at trial.

COUNT V: PATENT INFRINGEMENT OF THE '015 PATENT

105. Clear Imaging incorporates by reference the preceding paragraphs as if fully stated herein.

106. Apple has been and is now directly infringing and/or indirectly infringing the '015 patent by way of inducement, literally and/or under the Doctrine of Equivalents, in violation of 35 U.S.C. § 271, including by making, using, selling, and/or offering for sale in the United States or importing into the United States the '015 accused products.[39] Apple derives revenue from the activities relating to the '015 accused products. As explained below, these products are covered by at least one or more of the '015 patent asserted claims, including, but not limited to, claim 21.

107. Claim 21 of the '015 patent recites an "imaging apparatus for capturing digital video and for digital processing of images and video," a "user interface for displaying a preview of a field of view of the imaging apparatus, for receiving a user

[39] The '015 accused products are the Accused Products that include Cinematic Mode, including all of the various models of the iPhone 13 and 14 (*e.g.*, regular, mini, Pro, Pro Max, *etc.*).

input, and for displaying a final video." The '015 accused products include these elements, as shown by the evidence below.

Use Cinematic mode on your iPhone

With Cinematic mode, your iPhone camera can record videos with a shallow depth of field and add beautiful focus transitions for a cinema-grade look.

Before you get started

Make sure that you have the latest version of iOS and an iPhone that supports recording in Cinematic mode:

- iPhone 14 Pro Max
- iPhone 14 Pro
- iPhone 14
- iPhone 14 Plus
- iPhone 13 Pro Max
- iPhone 13 Pro
- iPhone 13
- iPhone 13 mini

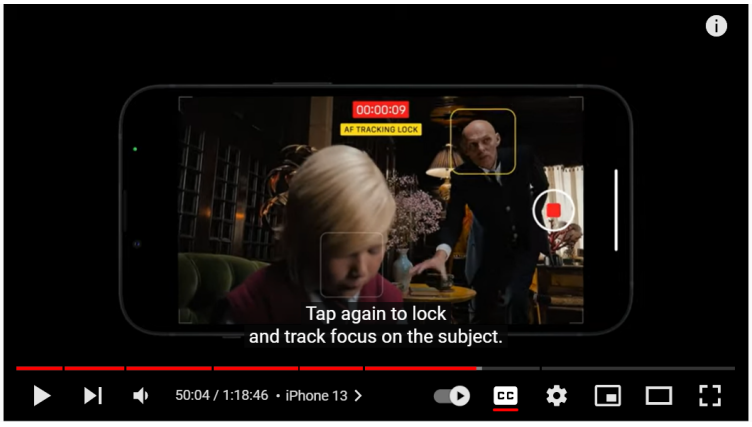
3. Tap the record button to begin recording.
4. Tap a subject in the viewfinder to change focus as you record. Double tap to set automatic focus tracking on a subject. You can also touch and hold on the screen to lock the focus at a specific distance from the camera.
5. Tap the record button again to stop recording.

Edit video taken in Cinematic mode

After you take a video in Cinematic mode, you can edit it in the Photos app on your iPhone 14 model, or on another supported device.

In addition to the standard edits that you can make to all videos, you can adjust the depth of field and the focus points of a video taken in Cinematic mode.

https://support.apple.com/en-us/HT212778



"[With Cinematic Mode] just start recording, and cinematic mode will hold focus on the subject even when they're moving…Tap again to lock and track focus on the subject"
https://www.youtube.com/watch?v=EvGOlAkLSLw

What Is Cinematic Mode?

Cinematic mode is a function found in Apple's default camera app. At its heart, this mode is all about adding depth-of-field to shots with smooth transitions between different subjects.

By using multiple cameras on the back of the device, Cinematic mode can intelligently track subjects as they enter or exit the scene and apply a faux depth-of-field effect not dissimilar to that seen in the iPhone's Portrait mode. This delivers a much more pronounced depth-of-field effect than you'd normally see in from a smartphone camera.

https://www.howtogeek.com/758306/how-to-use-cinematic-mode-to-shoot-better-video-on-iphone/#:~:text=By%20using%20multiple%20cameras%20on%20the%20back%20of,normally%20see%20in%20from%20a%20smartphone%20camera.%20Apple

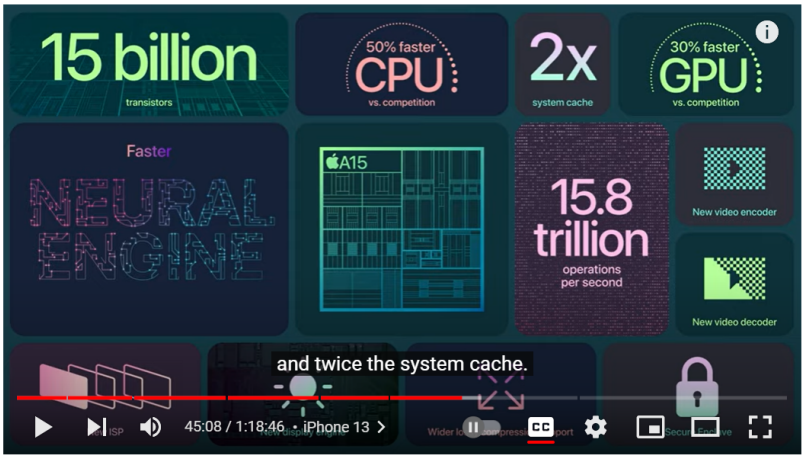
108. Claim 21 of the '015 patent recites a "lens comprising one or more lens elements," an "image sensor optically coupled to the lens for capturing a sequence of images," a "memory for storing images and video and for storing instructions for executing by a processor," and a "processor communicatively connected to the memory for receiving the instructions stored therein, wherein the instructions by the processor causes the processor to." The '015 accused products include these elements, as shown by the evidence below.

The TrueDepth camera system has been reengineered to provide more display area, while the redesigned rear camera layout with diagonally arranged lenses enables the advanced dual-camera system.

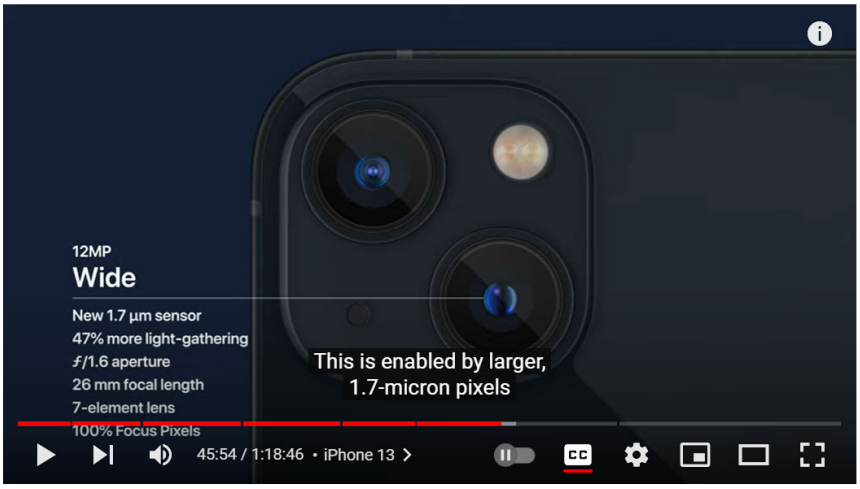
The Most Advanced Dual-Camera System in iPhone

iPhone 13 and iPhone 13 mini represent a massive leap in camera design with advancements in hardware and computational photography that deliver stunning photos and videos. The new Wide camera, with 1.7 µm pixels, comes with the biggest sensor ever in an iPhone dual-camera system and is capable of gathering 47 percent more light for less noise and brighter results. Sensor-shift OIS — a technology introduced in iPhone 12 Pro Max and not found in any other smartphone — also comes to the Wide camera, even in the more compact iPhone 13 mini. It stabilizes the sensor instead of the lens so shots are more steady, while the custom-designed Ultra Wide camera with a new sensor captures images with more detail in the dark areas of photos and videos with less noise.

https://www.apple.com/newsroom/2021/09/apple-introduces-iphone-13-and-iphone-13-mini/



Apple Event – September 14



Apple Event – September 14

"A15 is a powerhouse…[it has] twice the system cache. There's nothing in the world like this chip. A15…also powers the amazing camera system on iPhone 13. It combines our powerful cameras and next-generation image signal processor, and computational photography to create our most advanced dual-camera system…[It uses] larger 1.7 micron pixels that capture more light."
https://www.youtube.com/watch?v=EvGOlAkLSLw

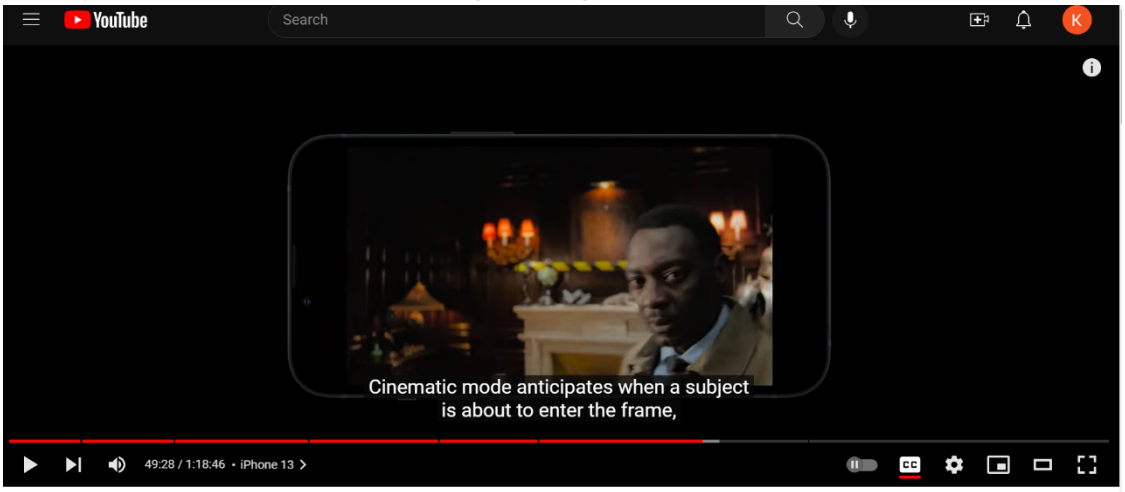
Step 1 iPhone 13 Pro Teardown

- While the regular and mini get some of the cool new tech for this generation, the iPhone 13 Pro gets it *all*. Here's what's on the menu:
- A15 Bionic SoC with a new 5-core GPU, 6-core CPU, and 16-core Neural Engine
- 6.1-inch (2532 × 1170 pixels) Super Retina XDR OLED display with ProMotion
- 12 MP triple camera system with an ultra-wide angle (ƒ/1.8), wide angle (ƒ/1.5), and 3x telephoto (ƒ/2.8) cameras, plus a LiDAR module.
- 6 GB of RAM and 128 GB of storage (configurable up to 1 TB)
- Sub-6 GHz 5G (and mmWave on the US models), 4x4 MIMO LTE, 2x2 MIMO 802.11ax Wi-Fi 6, Bluetooth 5.0, Ultra Wideband, and NFC
- MagSafe 15 W wireless charging
- IP68 water-resistance rating

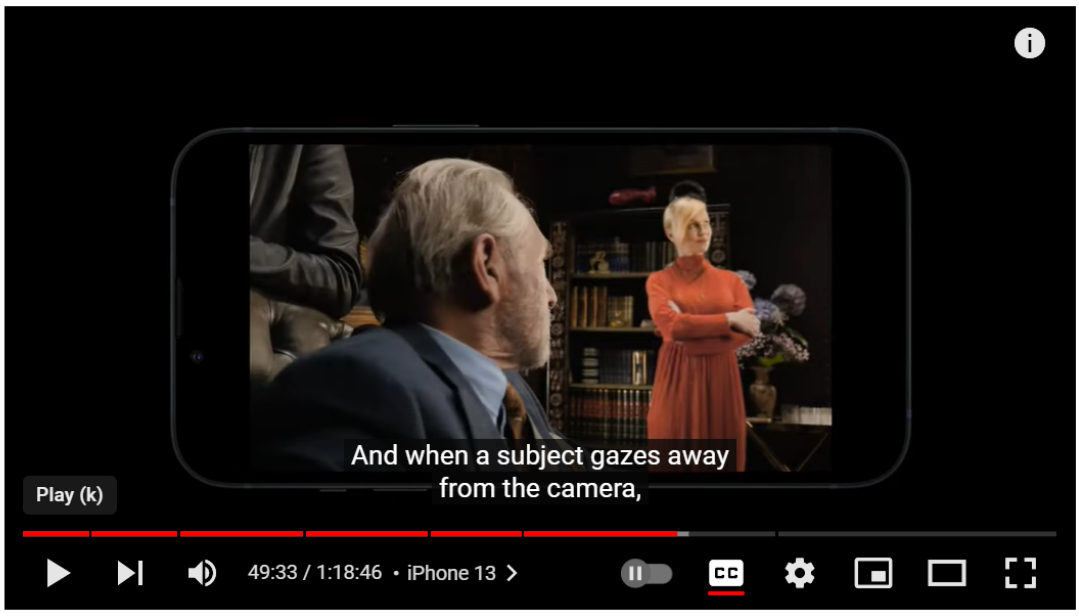
https://www.ifixit.com/Teardown/iPhone+13+Pro+Teardown/144928

109. Claim 21 of the '015 patent recites "receive a plurality of images from the memory," "determine a designated subject and a background in the plurality of

images based at least in part on a focal length of the lens and a relative shift between the plurality of images," and "generate a final video comprising a sequence of modified images, wherein each modified image is generated using two or more of the plurality if images received from the memory, and wherein the final video include the designated subject and the background, and the designated subject in the final video is blur free and the background is blurred." Apple's website and industry documentation describing Apple's products show that the '015 accused products satisfy these elements, including through Cinematic Mode.

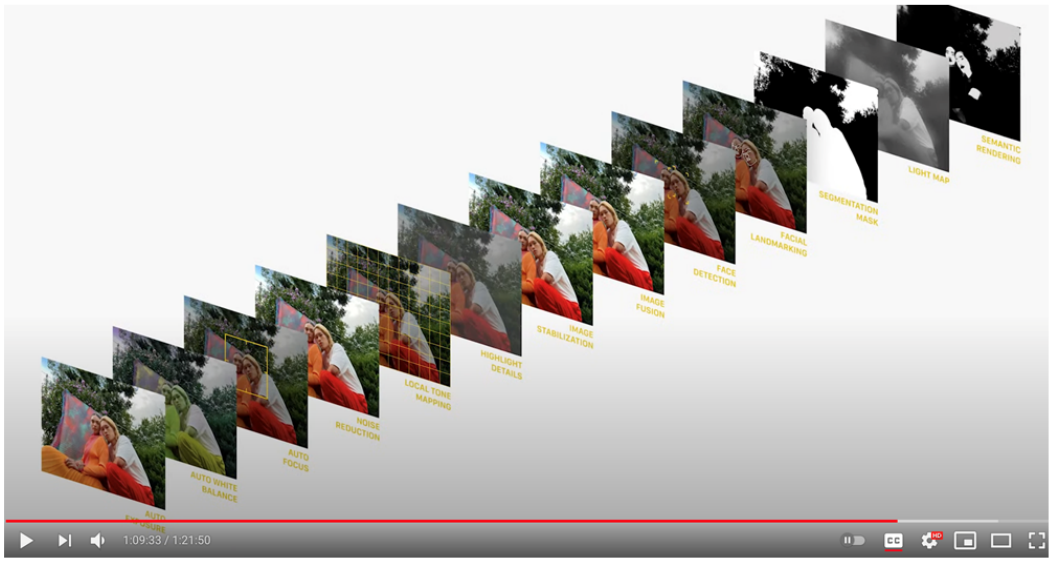


Apple Event – September 14



Apple Event – September 14

"Cinematic mode anticipates when a subject is about to enter the frame and intelligently racks focus to them when they do. And when a subject gazes away from the camera, iPhone itself changes focus and then back."
https://www.youtube.com/watch?v=EvGOlAkLSLw



"This is really awesome when using our all-new Cinematic mode, which uses machine learning and **disparity to create a depth map that's built into the video. So you can change the depth map, including the level of bokeh and where the focus is applied**, even after the capture. This is another iPhone first, as the iPhone 13 and the iPhone 13 Pro are the only smartphones that can do this." 1:14:16

WWDC2021
https://www.youtube.com/watch?v=EvGOlAkLSLw

Edit Cinematic mode videos on your iPhone

On iPhone 13 models and iPhone 14 models, Cinematic mode applies a depth-of-field effect that keeps the subject of your video sharp while creating a beautifully blurred foreground and background. In the Photos app, you can change the focus subject where the effect is applied, and adjust the level of background blur—or depth of field—in your Cinematic mode videos. You can also turn off the effect.

Cinematic mode videos recorded on iPhone 13 models and iPhone 14 models can be edited on iPhone Xs, iPhone XR, and later models with iOS 15 or later.

https://support.apple.com/en-gw/guide/iphone/iph5e602f6d6/ios

The iPhone 13 and iPhone 13 mini must use parallax to determine the various depths and distances present in a scene. This is where the feed of the wide and ultra-wide cameras is compared, and the discrepancies between their views of the scene can separate near objects from ones further away.

It may also analyze motion between frames. If you pan across a scene and assume that objects themselves are static, you can judge their relative distance by the amounts they move frame-to-frame. However, it seems unlikely that

https://www.techradar.com/news/what-is-cinematic-mode-the-iphone-13s-new-video-focusing-trick-explained

Thank you. First we need to define what a depth map is.

In the real world depth means the distance between you and an observed object.

A depth map is a transformation of a three-dimensional scene into a two-dimensional representation, and you do that by setting the depth to a constant distance.

Let me explain what I mean. I'm going to use a diagram of a pinhole camera often during this presentation. If you've studied computer vision, you'll be really familiar with pinhole cameras. A pinhole camera is a simple lightproof box without a lens. Instead, it just has a little poked hole, a single small aperture that permits light to enter in and project itself as an inverted image on the other side of the image plane, or a sensor. The opposite side is known as image plane or sensor.

The aperture through which the light rays pass is called the focal point, and the field of view of the image captured depends on the focal length. So the focal length is the distance from the focal point to the image plane. A shorter focal length means wider field of view; whereas, longer focal length, longer box, means narrower field of view.

....

Instead, we at Apple have chosen to express disparity using normalized values that are resilient to scaling operations. So here's how we do that. Again, going to our observed point, you'll notice that there are two similar triangles being formed. I'll highlight them for you.

These triangles have equal ratios of sides and proportions. Now, if I get rid of the cameras to just show you the triangles, the real-world triangle sides are Z, or meters, and baseline, the distance between the two optical centers.

Inside the light box, or the lightproof box, that same triangle is represented as the focal length in pixels and the disparity in pixels. Do you feel math coming on? I feel math coming on. So stay with me here. This is pretty painless.

Baseline is to Z as pixel disparity is to focal length.

....

When you attach a DepthDataOutput to your session, some things happen. The dual camera automatically zooms to 2X, that is the full field of view of the tele, and that's because in order to calculate disparity, the focal lengths need to be the same and at 2X zoom the wide-angle camera's focal length matches the tele.

WWDC 2017
http://web.archive.org/web/20220122231207/https://developer.apple.com/videos/play/wwdc2017/507/

110. Claim 21 of the '015 patent recites "store the final video in the memory," "store the final video in the memory," and "display the final video in the user interface." Apple's website and industry documentation describing Apple's products show that the '015 accused products satisfy these elements, including through Cinematic Mode.

Capacity[6]

128GB	128GB	128GB
256GB	256GB	256GB
512GB	512GB	512GB
1TB	1TB	

https://www.apple.com/iphone/compare/

111. As described above, Apple has had actual knowledge of the '015 patent, including through claim charts and other information provided by Clear Imaging, and actual knowledge that its activities constitute direct and/or indirect infringement of the '015 patent, yet they have not ceased their infringing activities. *See* Section

III. Apple's infringement of the '015 patent has been and continues to be willful and deliberate. Apple also has knowledge of the '015 patent by way of this complaint and, to the extent they do not cease their infringing activities, their infringement is and continues to be willful and deliberate.

112. Apple actively, knowingly, and intentionally induces infringement of one or more claims of the '015 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import '015 accused products in this judicial district and elsewhere in the United States. For example, Apple actively instructs, promotes, and encourages the use of the infringing features in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.apple.com), press releases, and user manuals, as well as at trade shows (e.g., annual Apple WWDC events) and through its sales and distribution channels that encourage infringing use, sales, offers to sell, and importation of the '015 accused products, as evidenced at least in part by the Apple statements and documents cited in this complaint. Apple user manuals for the '015 accused products instruct, promote, and encourage the use of the camera capability in an infringing manner. In addition, Apple documents and materials for the '015 accused products instruct, promote, and encourage use of Cinematic Mode.

113. Apple, by way of its infringing activities, has caused and continues to cause Plaintiff to suffer damages, the exact amount to be determined at trial.

COUNT VI: PATENT INFRINGEMENT OF THE '254 PATENT

114. Clear Imaging incorporates by reference the preceding paragraphs as if fully stated herein.

115. Apple has been and is now directly infringing and/or indirectly infringing the '254 patent by way of inducement, literally and/or under the Doctrine of Equivalents, in violation of 35 U.S.C. § 271, including by making, using, selling, and/or offering for sale in the United States or importing into the United States the

"'254 accused products."[40] Apple derives revenue from the activities relating to the '254 accused products. As explained below, these products are covered by one or more claims of the '254 patent, including but not limited to, Claim 11.

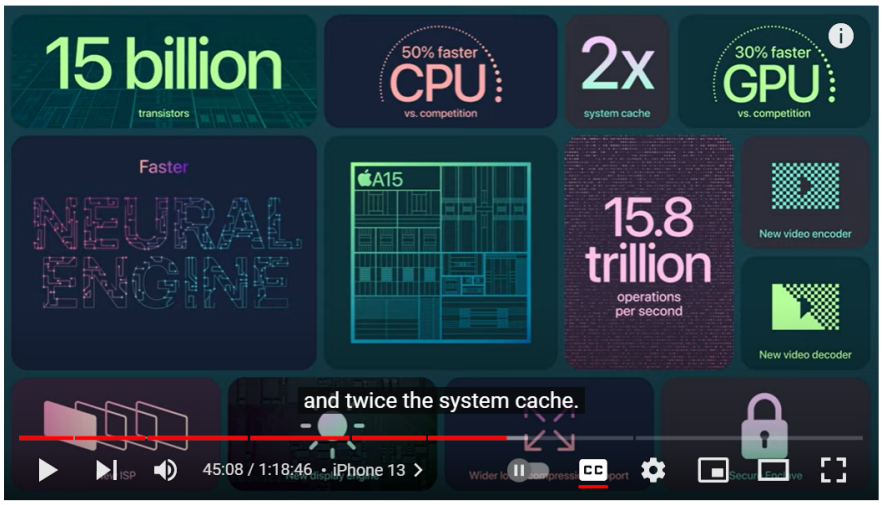
116. Claim 11 of the '254 patent recites an "An imaging apparatus for capturing digital images and video and for digital processing of images and video, comprising," "a user interface for displaying a preview of a field of view of the imaging apparatus, for receiving user input, and for displaying digital images and digital video," and "a lens comprising plurality of lens elements." The '254 patent accused products include these elements as shown by the evidence below.

iPhone camera basics

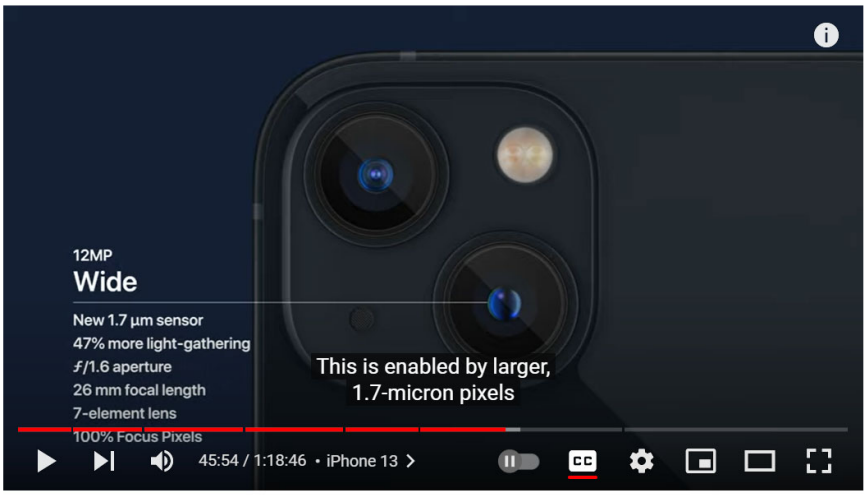
Learn how to take photos with Camera on your iPhone. Choose from camera modes such as Photo, Video, Cinematic, Pano, and Portrait, and zoom in or out to frame your shot.

https://support.apple.com/guide/iphone/camera-basics-iph263472f78/ios

[40] The '254 patent accused products includes all Accused iPhones since at least the iPhone 12 Pro Max, including the iPhone 12 Pro Max, and all iPhone 13 and 14 models in all varieties (Pro, Plus, Pro Max, regular, *etc.*). Sensor-shift stabilization has been in every iPhone since the iPhone 12 Pro Max.



Apple Event – September 14



Apple Event – September 14

"A15 is a powerhouse…[it has] twice the system cache. There's nothing in the world like this chip. A15…also powers the amazing camera system on iPhone 13. It combines our powerful cameras and next-generation image signal processor, and computational photography to create our most advanced dual-camera system…[It uses] larger 1.7 micron pixels that capture more light."
https://www.youtube.com/watch?v=EvGOlAkLSLw

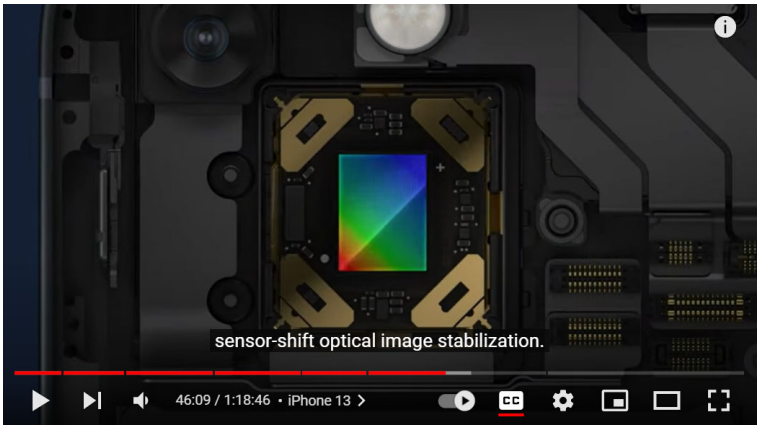
The TrueDepth camera system has been reengineered to provide more display area, while the redesigned rear camera layout with diagonally arranged lenses enables the advanced dual-camera system.

The Most Advanced Dual-Camera System in iPhone

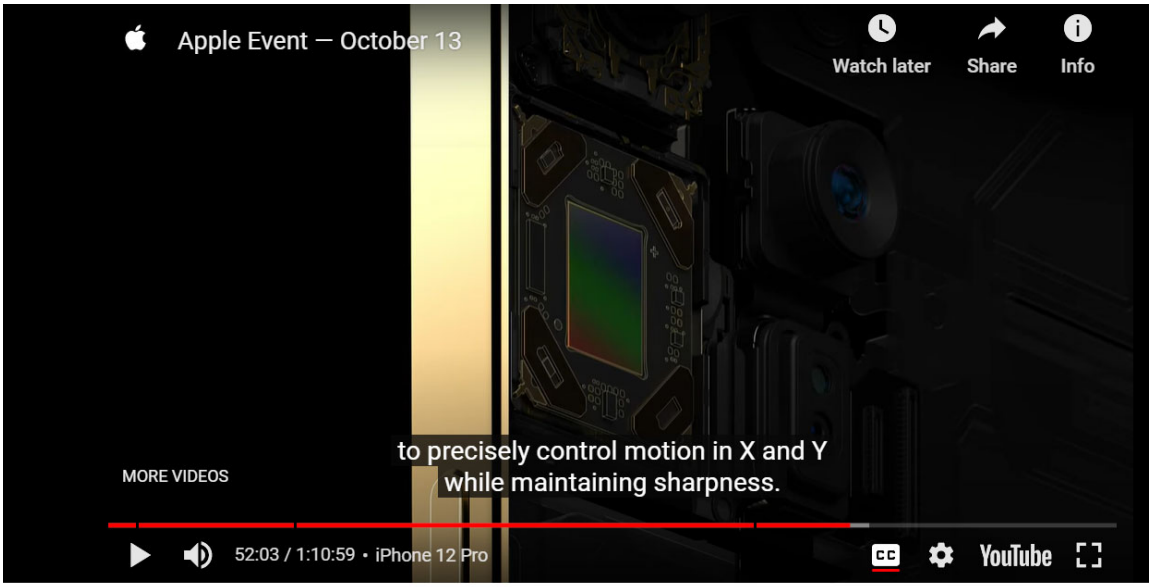
iPhone 13 and iPhone 13 mini represent a massive leap in camera design with advancements in hardware and computational photography that deliver stunning photos and videos. The new Wide camera, with 1.7 µm pixels, comes with the biggest sensor ever in an iPhone dual-camera system and is capable of gathering 47 percent more light for less noise and brighter results. Sensor-shift OIS — a technology introduced in iPhone 12 Pro Max and not found in any other smartphone — also comes to the Wide camera, even in the more compact iPhone 13 mini. It stabilizes the sensor instead of the lens so shots are more steady, while the custom-designed Ultra Wide camera with a new sensor captures images with more detail in the dark areas of photos and videos with less noise.

https://www.apple.com/newsroom/2021/09/apple-introduces-iphone-13-and-iphone-13-mini/

117. Claim 11 of the ’254 patent recites an “image sensor optically coupled to the lens for capturing digital images wherein the image sensor is movable inside the imaging apparatus,” “one or more image sensor adjusters that are coupled to the image sensor for moving the image sensor,” and “one or more motion sensors for detecting motion of the imaging apparatus and for generating a motion information based on the detected motion.”



"[iPhone 12 Pro Max] introduced an amazing advanced technology, sensor-shift optical image stabilization. And incredibly, we are bringing this to iPhone 13 and iPhone 13 mini."
https://www.youtube.com/watch?v=EvGOlAkLSLw



Apple Event — October 13
YouTube · 60.6M views · Oct 13, 2020

"[W]e developed a completely new system for optical image stabilization that adopts a high-end DSLR approach called sensor-shift. Sensor shift applies stabilization to the sensor instead of the heavier lens to precisely control motion in X and Y while maintaining sharpness. This cancels both low and high-frequency disturbances like hand movement or vibrations in a car…Along with motion processing advancements, we get stabilized exposure times of up to two seconds in low light for handheld shots. This sensor-shift system is unique to Apple and helps people capture everyday situations…and it delivers steady video with a truly cinematic feel."

https://www.bing.com/videos/search?q=Apple+Event+%E2%80%94+October+13+-+YouTube%2f&view=detail&mid=4335AEB551C4FDB126E54335AEB551C4FDB126E5&FORM=VIRE

Sensor shift stabilization is coming to all iPhone 13 models and it is the biggest innovation in stabilization technology on phones in literally a decade, so you might be wondering what exactly is *sensor shift stabilization* and how it is different from the *optical image stabilization* (OIS) that most phones have used so far?

...

- With sensor shift stabilization, the lens unit doesn't move, but it is instead the sensor that moves around and even faster, with up to 5,000 adjustments per second. Having that adjustment directly where the image capture happens, at the sensor, results in improved results.

...

So the theory boils down to those tiny electromagnetic actuators that with OIS moved the lens around based on data from a gyroscope, while with sensor shift, it the sensor instead of the lens. Since the sensor is actually lighter than the lenses, this approach should mean it is faster to correcting movements.

https://www.phonearena.com/news/What-is-sensor-shift-stabilization-vs-OIS_id133572

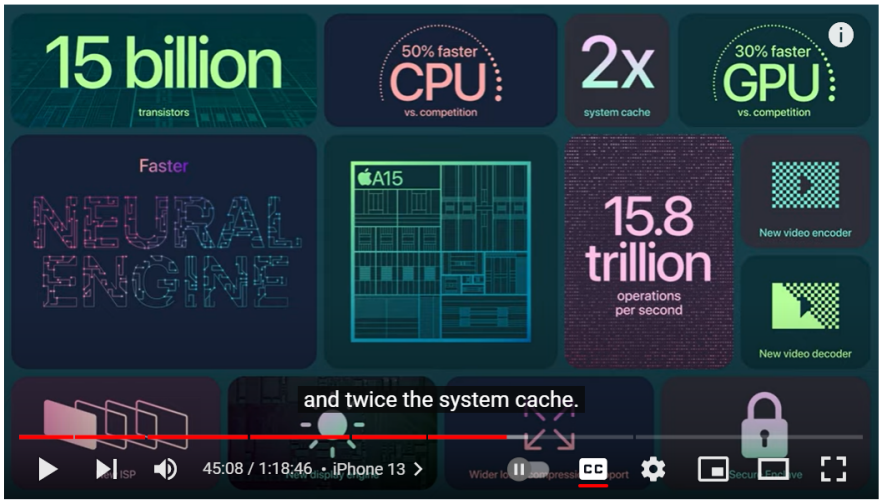
Sensors

- Face ID
- LiDAR Scanner
- Barometer
- Three-axis gyro
- Accelerometer
- Proximity sensor
- Ambient light sensor

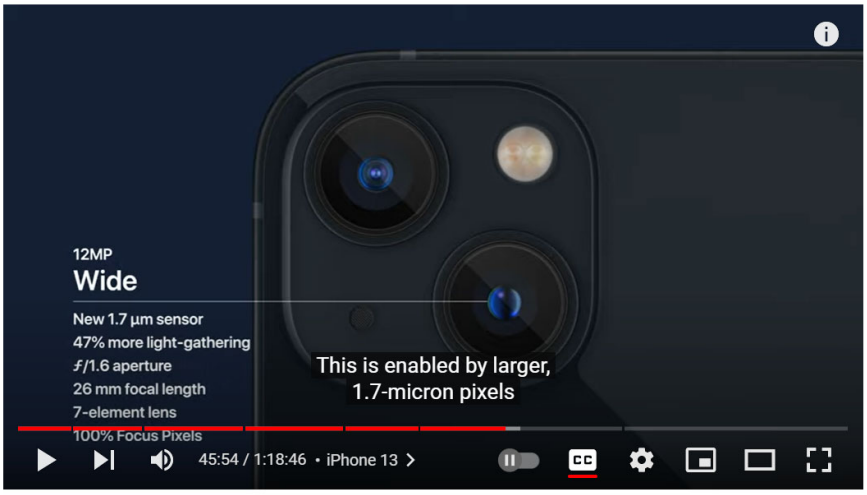
https://support.apple.com/kb/SP832?locale=en_US

118. Claim 11 of the '254 patent recites a "memory, and a first and a second set of instructions for executing by a processor stored in the memory," and a "processor communicatively connected to the memory for receiving the instructions stored therein, wherein executing the first set of instructions by the processor causes

the processor to:" The '254 patent accused products recite these elements as shown by the evidence below.



Apple Event – September 14



Apple Event – September 14

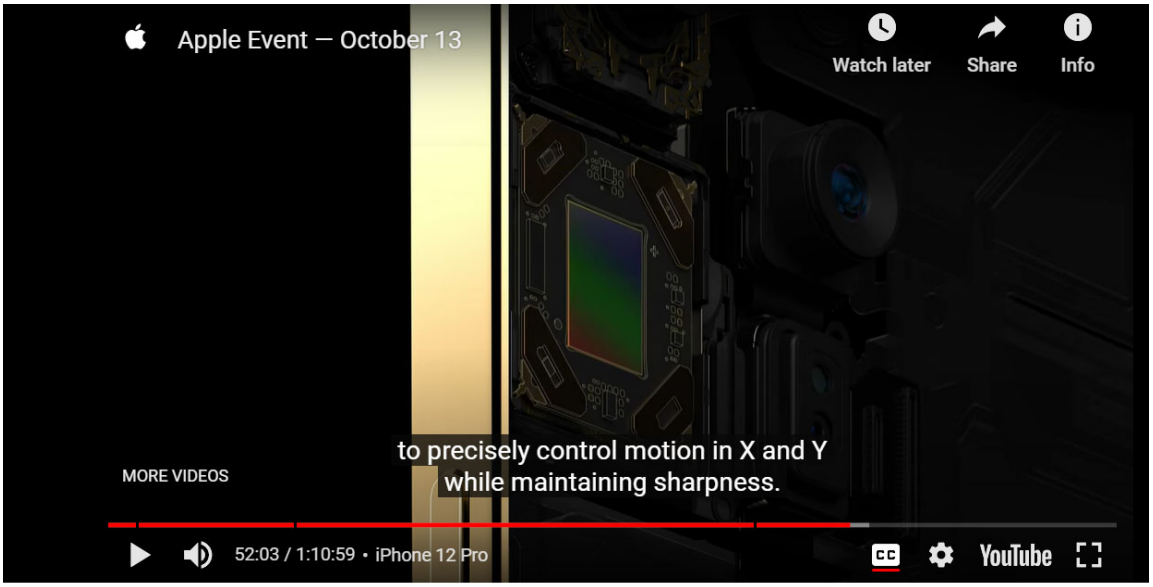
"A15 is a powerhouse…[it has] twice the system cache. There's nothing in the world like this chip. A15…also powers the amazing camera system on iPhone 13. It combines our powerful cameras and next-generation image signal processor, and computational photography to create our most advanced dual-camera system…[It uses] larger 1.7 micron pixels that capture more light."
https://www.youtube.com/watch?v=EvGOlAkLSLw

Capacity[6]

128GB	128GB	128GB
256GB	256GB	256GB
512GB	512GB	512GB
1TB	1TB	

https://www.apple.com/iphone/compare/

119. Claim 11 of the '254 patent recites "receive the motion information from the one or more motion sensors," "cause the one or more image sensor adjusters to move the image sensor inside the imaging apparatus based on the motion information," "capture an image by the image sensor through the lens," "store the captured image in the memory," and "display the captured image in the memory." The '254 patent accused products recite these elements as shown by the exemplary evidence below, including through the use of Apple's image stabilization, which includes Sensor-Shift Stabilization, as shown in the preceding paragraphs and below.



Apple Event — October 13
YouTube · 60.6M views · Oct 13, 2020

"[W]e developed a completely new system for optical image stabilization that adopts a high-end DSLR approach called sensor-shift. Sensor shift applies stabilization to the sensor instead of the heavier lens to precisely control motion in X and Y while maintaining sharpness. This cancels both low and high-frequency disturbances like hand movement or vibrations in a car…Along with motion processing advancements, we get stabilized exposure times of up to two seconds in low light for handheld shots. This sensor-shift system is unique to Apple and helps people capture everyday situations…and it delivers steady video with a truly cinematic feel"

https://www.bing.com/videos/search?q=Apple+Event+%E2%80%94+October+13+
+YouTube%2f&view=detail&mid=4335AEB551C4FDB126E54335AEB551C4FDB126E5&FORM=VIRE

120. Claim 11 of the '254 patent recites "executing the second set of instructions by the processor causes the processor to:" "determine a number of images to be captured, and determine a shutter speed for the images to be captured," "receive the number of images captured by the image sensor using the shutter speed determined," "process the sequence of images to calculate pixel values for a corrected image based on pixel values in the sequence of images," "store the corrected image in the memory," and "display the corrected image in the memory." The '254 patent accused products recite these elements as shown by the evidence

below, including through the use of Apple's image stabilization (including Auto Image Stabilization, Deep Fusion, Multi-Frame Image Processing, and/or Night Mode) as shown below.

)EEP FUSION technology , 24millions of pixels , iPhone 11pro by @Apple
YouTube · 16.1K views · Sep 10, 2019 · by TEG. MAG

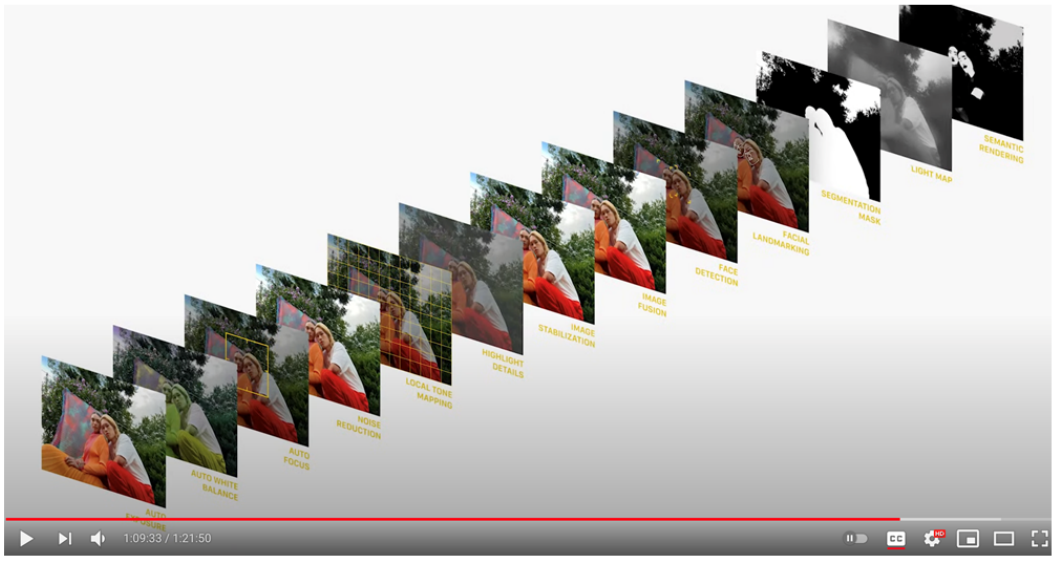
Discussing Deep Fusion and stating "It shoots 9 images. Before you press the shutter button, it's already shot four short images, four secondary images, and when you press the shutter button it takes one long exposure and then in just one second the neural engine analyzes the fused combination of long and short images picking the best among them, selecting all the pixels, and pixel by pixel and going through 24 million pixels to optimize for detail and low noise. It is amazing." https://www.bing.com/videos/search?q=DEEP+FUSION+technology+%2c+24millions+of+pixels+%2c+iPhone+11pro+by+%40Apple+-+YouTube&docid=608051349794999617&mid=C2D867B5A040F8BABCC6C2D867B5A040F8BABCC6&view=detail&FORM=VIR

> Rather than having a button or an option to enable Deep Fusion on the iPhone camera, instead Apple has designed Deep Fusion to happen automatically when it's optimal, without user involvement.
>
> In other words, Deep Fusion is enabled by itself, but only when the iPhone camera sensor detects that it would improve a photo taken on the iPhone.

….

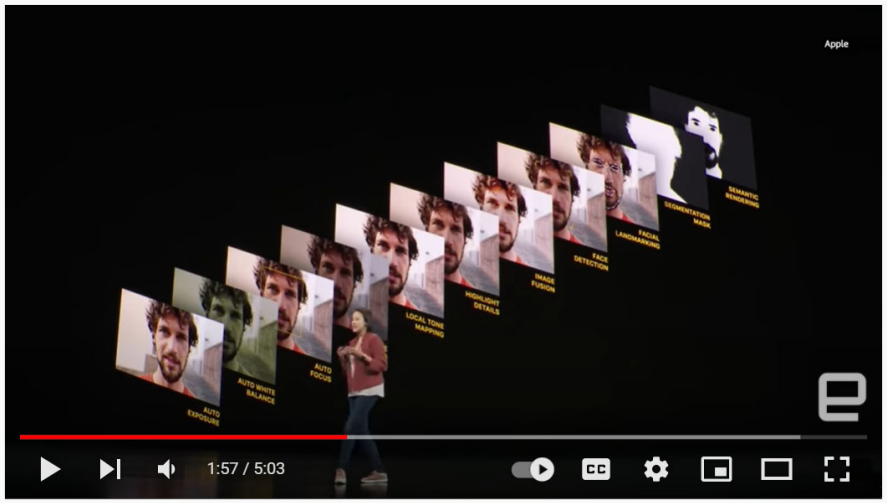
> In short, in proper lighting situations, the iPhone camera will snap a series of nine photos of the same scene, then Deep Fusion uses machine learning to determine which of the combinations of the photos will result in the sharpest and best possible picture. That may mean blending components of those nine photos together to get the best possible resolution and quality of an image.
>
> …
>
> Because Deep Fusion photos are not marked in EXIF or metadata, it can be challenging to figure out which exactly are using the camera technology, but if a photo looks especially great and sharp, it's a good bet it was snapped with Deep Fusion on the iPhone 11, iPhone 11 Pro, or iPhone 11 Pro Max, iPhone 12, iPhone 12 Pro, or iPhone 12 Pro Max, or better.

https://osxdaily.com/2020/02/29/how-use-deep-fusion-iphone-11-camera/



"This is a feature that pro photographers are going to love. Photographic Styles bring your individual preferences right into our advanced image pipeline, applying local edits like a photo editor would, but in real time as we render the photo. That means you get all the benefits of our **multi-frame image processing pipeline** with the ability to customize it in a way you could never achieve with a simple filter." 1:09:26

WWDC2021
https://www.youtube.com/watch?v=EvGOlAkLSLw



iPhone 11 keynote in 5 minutes

(discussing "image fusion" and then stating "Now let's discuss Night Mode… it intelligently fuse images together reducing motion and blur").

https://www.bing.com/videos/riverview/relatedvideo?&q=iPhone+11+keynote+in+5+minutes++YouTube&&mid=FB7A88DF69CD1E816A36FB7A88DF69CD1E816A36&&FORM=VRDGA

> Craig Federighi, SVP Software Engineering, says, "A really great sensor is only the beginning of how iPhone 5S takes really amazing photos and video."
>
> "In low light, iPhone 5S uses the new auto image stabilization," he says. "When you press the shutter, it imperceptibly takes up to four very quick photos, intelligently merging them to reduce blurring from camera shake and subject motion. And in really low light, it uses the all new True Tone flash. iPhone 5S measures the color temperature of the available light, then fires the white and amber flashes together in just the right ratio to create a balanced image. The colors in your photos will look truer your skin tones more natural."
>
> …
>
> "Any digital camera is only as good as its sensor," explains Dan Riccio, Apple SVP, Hardware Engineering. "While more pixels produce a bigger picture, we prefer bigger pixels because they mean an even better picture. With iPhone 5S we started with a wider f2.2 aperture. That combined with our new state of the art 8 megapixel backside-illuminated CMOS sensor that is fifteen percent larger than before means each 1.5 micron pixel can convert thirty-three percent more light into image data. This is all processed by the new A7 chip with 64-bit desktop class architecture."

https://www.webpronews.com/heres-what-the-iphone-5s-camera-can-do-video/

https://www.apple.com/iphone/compare/

121. As described above, Apple has had actual knowledge of the '254 patent (or at the very least actual knowledge of the specification of the '254 patent) and actual knowledge that its activities constitute direct and/or indirect infringement of the '254 patent (at the very least by the filing of this complaint), yet they have not ceased their infringing activities. *See* Section III. Apple's infringement of the '254 patent has been and continues to be willful and deliberate. Apple also has knowledge of the '254 patent by way of this complaint and, to the extent they do not cease their infringing activities, their infringement is and continues to be willful and deliberate.

122. Apple actively, knowingly, and intentionally induces infringement of one or more claims of the '254 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import '254 accused products in this judicial district and elsewhere in the United States. For example, Apple actively instructs, promotes, and encourages the use of the infringing features in marketing materials, technical specifications, data sheets, web pages on its

website (e.g., www.apple.com), press releases, and user manuals, as well as at trade shows (e.g., annual Apple WWDC events) and through its sales and distribution channels that encourage infringing use, sales, offers to sell, and importation of the '254 accused products, as evidenced at least in part by the Apple statements and documents cited in this complaint. Apple user manuals for the '254 accused products instruct, promote, and encourage the use of the camera capability in an infringing manner. In addition, Apple documents and materials for the '254 accused products instruct, promote, and encourage use of Apple's image stabilization (including Sensor-Shift Stabilization, Auto Image Stabilization, Deep Fusion, Multi-Frame Image Processing, and/or Night Mode).

123. Apple, by way of its infringing activities, has caused and continues to cause Plaintiff to suffer damages, the exact amount to be determined at trial.

COUNT VII: PATENT INFRINGEMENT OF THE '391 PATENT

124. Clear Imaging incorporates by reference the preceding paragraphs as if fully stated herein.

125. Apple has been and is now directly infringing and/or indirectly infringing the '391 patent by way of inducement, literally and/or under the Doctrine of Equivalents, in violation of 35 U.S.C. § 271, including by making, using, selling, and/or offering for sale in the United States or importing into the United States the "'391 accused products."[41] Apple derives revenue from the activities relating to the '391 accused products. As explained below, these products are covered by one or more claims of the '391 patent, including but not limited to, Claim 8.

126. Claim 8 of the '391 patent recites an "imaging apparatus for capturing and digitally processing video, comprising," a "user interface for displaying a preview of a field of view of the imaging apparatus, for receiving user input, and for displaying a final video," "one or more lenses," and "one or more image sensors

[41] The '391 accused products are the same as the '015 accused products.

optically coupled to the one or more lenses for capturing an image data representing a sequence of images." The '391 patent accused products recite these elements as shown by the evidence below.

Use Cinematic mode on your iPhone

With Cinematic mode, your iPhone camera can record videos with a shallow depth of field and add beautiful focus transitions for a cinema-grade look.

Before you get started

Make sure that you have the latest version of iOS and an iPhone that supports recording in Cinematic mode:

- iPhone 14 Pro Max
- iPhone 14 Pro
- iPhone 14
- iPhone 14 Plus
- iPhone 13 Pro Max
- iPhone 13 Pro
- iPhone 13
- iPhone 13 mini

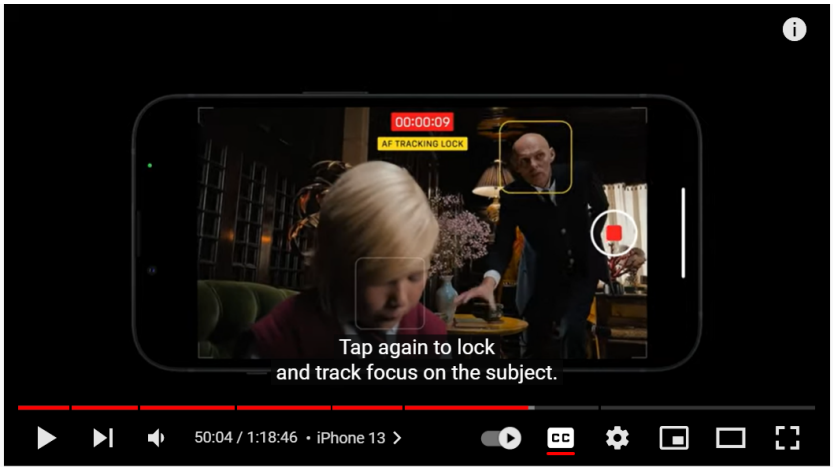
3. Tap the record button to begin recording.
4. Tap a subject in the viewfinder to change focus as you record. Double tap to set automatic focus tracking on a subject. You can also touch and hold on the screen to lock the focus at a specific distance from the camera.
5. Tap the record button again to stop recording.

Edit video taken in Cinematic mode

After you take a video in Cinematic mode, you can edit it in the Photos app on your iPhone 14 model, or on another supported device.

In addition to the standard edits that you can make to all videos, you can adjust the depth of field and the focus points of a video taken in Cinematic mode.

https://support.apple.com/en-us/HT212778



"[With Cinematic Mode] just start recording, and cinematic mode will hold focus on the subject even when they're moving…Tap again to lock and track focus on the subject"
https://www.youtube.com/watch?v=EvGOlAkLSLw

What Is Cinematic Mode?

Cinematic mode is a function found in Apple's default camera app. At its heart, this mode is all about adding depth-of-field to shots with smooth transitions between different subjects.

By using multiple cameras on the back of the device, Cinematic mode can intelligently track subjects as they enter or exit the scene and apply a faux depth-of-field effect not dissimilar to that seen in the iPhone's Portrait mode. This delivers a much more pronounced depth-of-field effect than you'd normally see in from a smartphone camera.

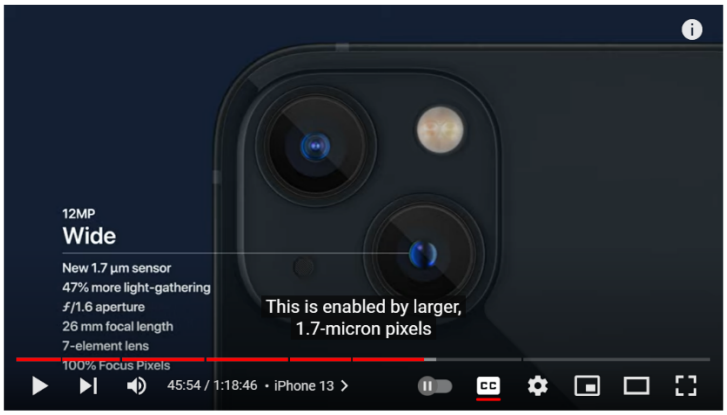
https://www.howtogeek.com/758306/how-to-use-cinematic-mode-to-shoot-better-video-on-iphone/#:~:text=By%20using%20multiple%20cameras%20on%20the%20back%20of,normally%20see%20in%20from%20a%20smartphone%20camera.%20Apple

The TrueDepth camera system has been reengineered to provide more display area, while the redesigned rear camera layout with diagonally arranged lenses enables the advanced dual-camera system.

The Most Advanced Dual-Camera System in iPhone

iPhone 13 and iPhone 13 mini represent a massive leap in camera design with advancements in hardware and computational photography that deliver stunning photos and videos. The new Wide camera, with 1.7 µm pixels, comes with the biggest sensor ever in an iPhone dual-camera system and is capable of gathering 47 percent more light for less noise and brighter results. Sensor-shift OIS — a technology introduced in iPhone 12 Pro Max and not found in any other smartphone — also comes to the Wide camera, even in the more compact iPhone 13 mini. It stabilizes the sensor instead of the lens so shots are more steady, while the custom-designed Ultra Wide camera with a new sensor captures images with more detail in the dark areas of photos and videos with less noise.

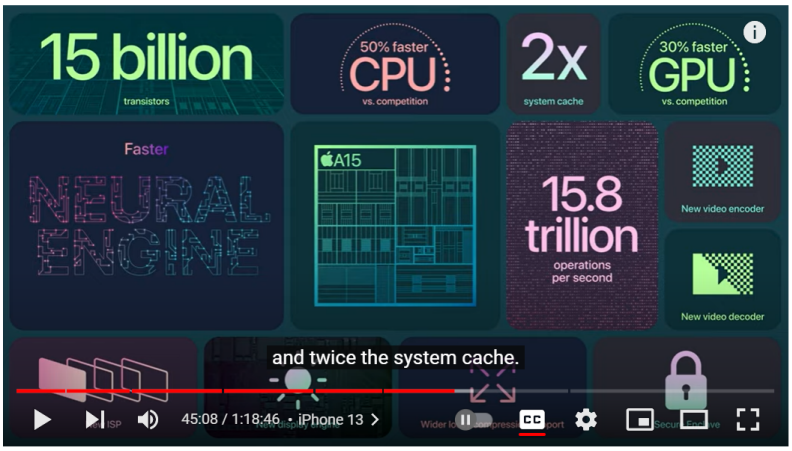
https://www.apple.com/newsroom/2021/09/apple-introduces-iphone-13-and-iphone-13-mini/



Apple Event – September 14

"A15 is a powerhouse…[it has] twice the system cache. There's nothing in the world like this chip. A15…also powers the amazing camera system on iPhone 13. It combines our powerful cameras and next-generation image signal processor, and computational photography to create our most advanced dual-camera system…[It uses] larger 1.7 micron pixels that capture more light."
https://www.youtube.com/watch?v=EvGOlAkLSLw

127. Claim 8 of the '391 patent recites "a memory for storing the image data and for storing an instructions for executing on a processor" and "a processor communicatively connected to the memory for receiving the instructions stored therein, wherein executing the instructions by the processor causes the processor to." The '391 patent accused products recite these elements as shown by the evidence below.



Apple Event – September 14

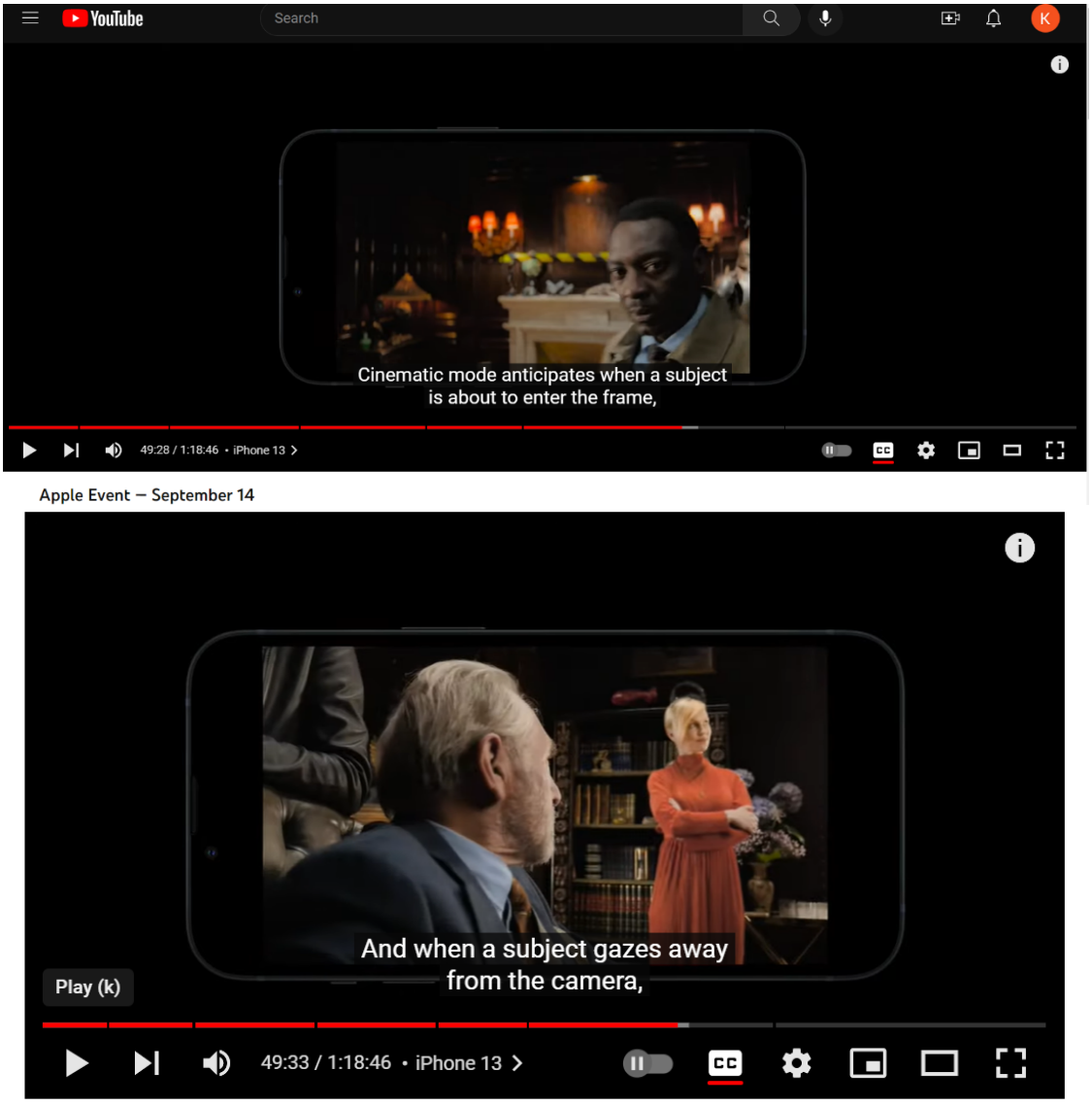
https://www.youtube.com/watch?v=EvGOlAkLSLw

Step 1 iPhone 13 Pro Teardown

- While the regular and mini get some of the cool new tech for this generation, the iPhone 13 Pro gets it *all*. Here's what's on the menu:
  - A15 Bionic SoC with a new 5-core GPU, 6-core CPU, and 16-core Neural Engine
  - 6.1-inch (2532 × 1170 pixels) Super Retina XDR OLED display with ProMotion
  - 12 MP triple camera system with an ultra-wide angle (ƒ/1.8), wide angle (ƒ/1.5), and 3x telephoto (ƒ/2.8) cameras, plus a LiDAR module.
  - 6 GB of RAM and 128 GB of storage (configurable up to 1 TB)
  - Sub-6 GHz 5G (and mmWave on the US models), 4x4 MIMO LTE, 2x2 MIMO 802.11ax Wi-Fi 6, Bluetooth 5.0, Ultra Wideband, and NFC
  - MagSafe 15 W wireless charging
  - IP68 water-resistance rating

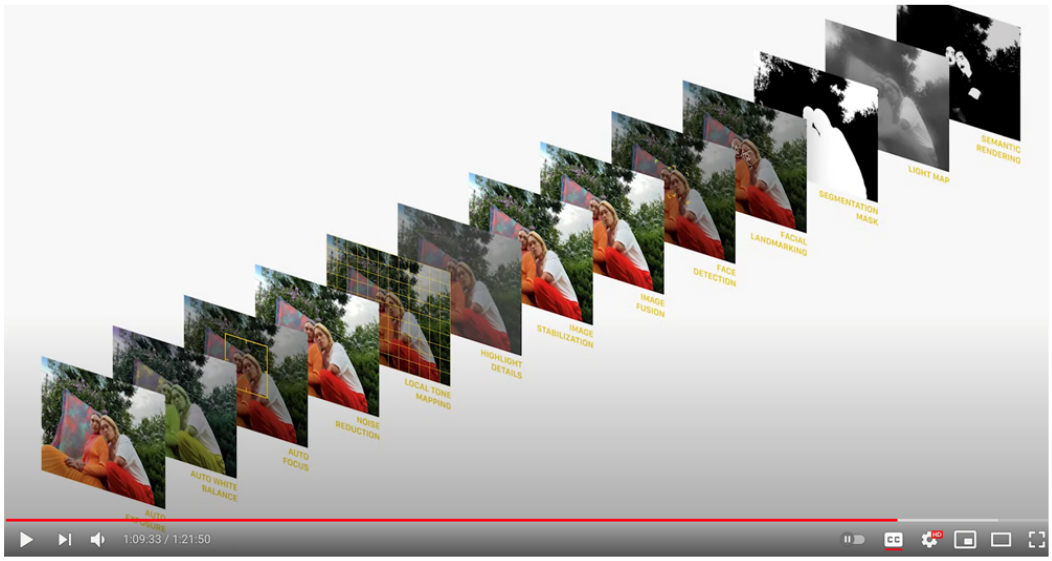
https://www.ifixit.com/Teardown/iPhone+13+Pro+Teardown/144928

128. Claim 8 of the ’391 patent recites “read the image data representing the sequence of images from the memory of the imaging apparatus” and “designate a main subject and a background in the sequence of images based on digital processing of two or more of the sequence of images.” The ’391 patent accused products recite these elements as shown by the evidence below.



Apple Event – September 14

"Cinematic mode anticipates when a subject is about to enter the frame and intelligently racks focus to them when they do. And when a subject gazes away from the camera, iPhone itself changes focus and then back."
https://www.youtube.com/watch?v=EvGOlAkLSLw



"This is really awesome when using our all-new Cinematic mode, which uses machine learning and **disparity to create a depth map that's built into the video. So you can change the depth map, including the level of bokeh and where the focus is applied, even after the capture**. This is another iPhone first, as the iPhone 13 and the iPhone 13 Pro are the only smartphones that can do this." 1:14:16

WWDC2021
https://www.youtube.com/watch?v=EvGOlAkLSLw

Edit Cinematic mode videos on your iPhone

On iPhone 13 models and iPhone 14 models, Cinematic mode applies a depth-of-field effect that keeps the subject of your video sharp while creating a beautifully blurred foreground and background. In the Photos app, you can change the focus subject where the effect is applied, and adjust the level of background blur—or depth of field—in your Cinematic mode videos. You can also turn off the effect.

Cinematic mode videos recorded on iPhone 13 models and iPhone 14 models can be edited on iPhone Xs, iPhone XR, and later models with iOS 15 or later.

https://support.apple.com/en-gw/guide/iphone/iph5e602f6d6/ios

The iPhone 13 and iPhone 13 mini must use parallax to determine the various depths and distances present in a scene. This is where the feed of the wide and ultra-wide cameras is compared, and the discrepancies between their views of the scene can separate near objects from ones further away.

It may also analyze motion between frames. If you pan across a scene and assume that objects themselves are static, you can judge their relative distance by the amounts they move frame-to-frame. However, it seems unlikely that

https://www.techradar.com/news/what-is-cinematic-mode-the-iphone-13s-new-video-focusing-trick-explained

> Thank you. First we need to define what a depth map is.
>
> In the real world depth means the distance between you and an observed object.
>
> A depth map is a transformation of a three-dimensional scene into a two-dimensional representation, and you do that by setting the depth to a constant distance.
>
> Let me explain what I mean. I'm going to use a diagram of a pinhole camera often during this presentation. If you've studied computer vision, you'll be really familiar with pinhole cameras. A pinhole camera is a simple lightproof box without a lens. Instead, it just has a little poked hole, a single small aperture that permits light to enter in and project itself as an inverted image on the other side of the image plane, or a sensor. The opposite side is known as image plane or sensor.
>
> The aperture through which the light rays pass is called the focal point, and the field of view of the image captured depends on the focal length. So the focal length is the distance from the focal point to the image plane. A shorter focal length means wider field of view; whereas, longer focal length, longer box, means narrower field of view.
>
> The focal length is that constant distance by which real world distances are flattened into a 2D image. Put simply, a depth map is a transformation of a 3D depth into a 2D, single channel image where each pixel value is a different depth, like five meters, four meters, three meters.

....

> Instead, we at Apple have chosen to express disparity using normalized values that are resilient to scaling operations. So here's how we do that. Again, going to our observed point, you'll notice that there are two similar triangles being formed. I'll highlight them for you.
>
> These triangles have equal ratios of sides and proportions. Now, if I get rid of the cameras to just show you the triangles, the real-world triangle sides are Z, or meters, and baseline, the distance between the two optical centers.
>
> Inside the light box, or the lightproof box, that same triangle is represented as the focal length in pixels and the disparity in pixels. Do you feel math coming on? I feel math coming on. So stay with me here. This is pretty painless.
>
> Baseline is to Z as pixel disparity is to focal length.

....

> When you attach a DepthDataOutput to your session, some things happen. The dual camera automatically zooms to 2X, that is the full field of view of the tele, and that's because in order to calculate disparity, the focal lengths need to be the same and at 2X zoom the wide-angle camera's focal length matches the tele.

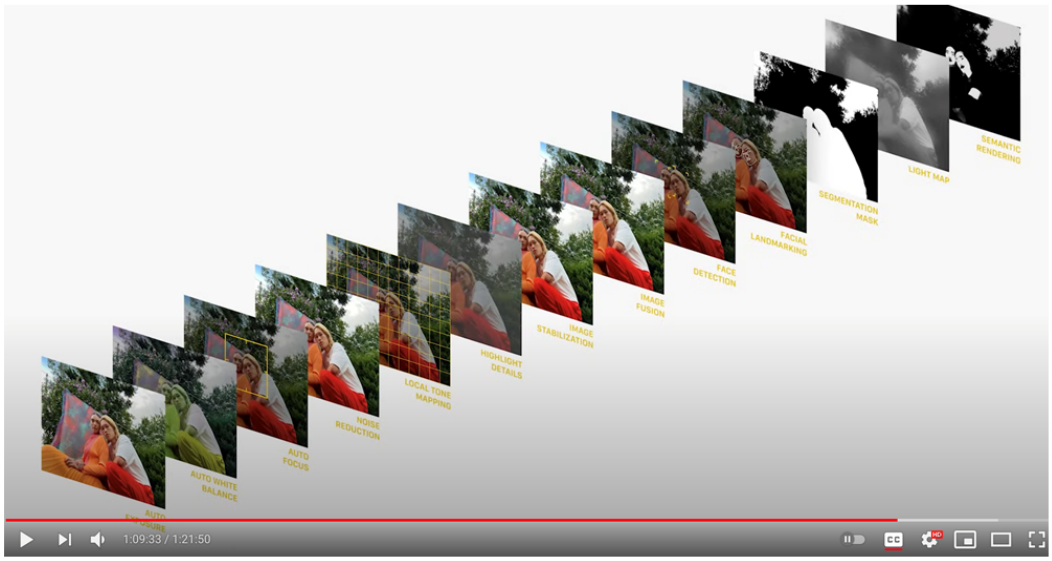
WWDC 2017
http://web.archive.org/web/20220122231207/https://developer.apple.com/videos/play/wwdc2017/507/

That depth map created by the wide-angle lens is crucial to the end result, because it helps Apple's image signal processor figure out what should be sharp and what should be blurred.

Courtesy of Melia Robinson

https://www.businessinsider.com/apple-iphone-portrait-mode-explained-2017-10#that-depth-map-created-by-the-wide-angle-lens-is-crucial-to-the-end-result-because-it-helps-apples-image-signal-processor-figure-out-what-should-be-sharp-and-what-should-be-blurred-3

129. Claim 8 of the '391 patent recites "obtain a sequence of modified images for use in a final video, wherein pixel values for each modified image is calculated using pixel values of the two or more images of the sequence of images such that the main subject in the modified image is blur free and the background is blurred." The '391 patent accused products recite these elements as shown by the evidence below and in the preceding paragraphs.



"This is really awesome when using our all-new Cinematic mode, which uses machine learning and **disparity to create a depth map that's built into the video. So you can change the depth map, including the level of bokeh and where the focus is applied, even after the capture**. This is another iPhone first, as the iPhone 13 and the iPhone 13 Pro are the only smartphones that can do this." 1:14:16

WWDC2021
https://www.youtube.com/watch?v=EvGOlAkLSLw

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A depth map is a transformation of a three-dimensional scene into a two-dimensional representation, and you do that by setting the depth to a constant distance.

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The aperture through which the light rays pass is called the focal point, and the field of view of the image captured depends on the focal length. So the focal length is the distance from the focal point to the image plane. A shorter focal length means wider field of view; whereas, longer focal length, longer box, means narrower field of view.

The focal length is that constant distance by which real world distances are flattened into a 2D image. Put simply, a depth map is a transformation of a 3D depth into a 2D, single channel image where each pixel value is a different depth, like five meters, four meters, three meters.

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...

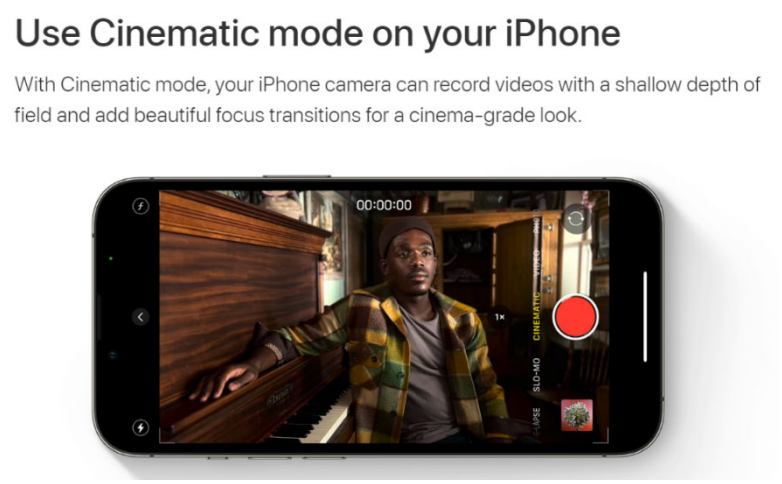
> The focus actuators are actually springs to which an electrical current is applied. So all of these reasons might cause it to move around laterally a little bit, and these very small errors in optical center position can result in large errors in disparity.
>
> When this occurs, the result is a constant amount of error in every pixel in the map.

...

> fx and fy are the pixel focal length. They're separate x and y values because sometimes cameras have anamorphic lens or anamorphic pixels. On iOS devices, our cameras always have square pixels, so fx and fy are always going to be the same value.
>
> Then x naught and y naught are the pixel coordinates of the lens' principal point, or optical center. These are all in pixel values and they're given at the resolution of the video buffer with which they're provided. So, once you've opted in, you can expect to get sample buffers in a streaming fashion and you can get this attachment from them, and the payload is a C/F data that wraps a matrix float 3x3, which is a SIMD data type. If you're doing computer vision, you'll be really interested in this new feature.

WWDC 2017
http://web.archive.org/web/20220122231207/https://developer.apple.com/videos/play/wwdc2017/507/

130. Claim 8 of the ’391 patent recites “combine the sequence of modified images to obtain the final video,” “store the final video in the memory,” and “display the final video in the user interface.” The ’391 patent accused products recite these elements as shown by the evidence in the preceding paragraphs and below.



https://support.apple.com/en-us/HT212778

https://www.apple.com/iphone/compare/

131. As described above, Apple has had actual knowledge of the '391 patent (or at the very least actual knowledge of the specification of the '391 patent) and actual knowledge that its activities constitute direct and/or indirect infringement of the '391 patent (at the very least by the filing of this complaint), yet they have not ceased their infringing activities. *See* Section III. Apple's infringement of the '391 patent has been and continues to be willful and deliberate. Apple also has knowledge

of the '391 patent by way of this complaint and, to the extent they do not cease their infringing activities, their infringement is and continues to be willful and deliberate.

132. Apple actively, knowingly, and intentionally induces infringement of one or more claims of the '391 patent under 35 U.S.C. § 271(b) by actively encouraging others to make, use, offer to sell, sell, and/or import '391 accused products in this judicial district and elsewhere in the United States. For example, Apple actively instructs, promotes, and encourages the use of the infringing features in marketing materials, technical specifications, data sheets, web pages on its website (e.g., www.apple.com), press releases, and user manuals, as well as at trade shows (e.g., annual Apple WWDC events) and through its sales and distribution channels that encourage infringing use, sales, offers to sell, and importation of the '391 accused products, as evidenced at least in part by the Apple statements and documents cited in this complaint. Apple user manuals for the '391 accused products instruct, promote, and encourage the use of the camera capability in an infringing manner. In addition, Apple documents and materials for the '391 accused products instruct, promote, and encourage use of Cinematic Mode.

133. Apple, by way of its infringing activities, has caused and continues to cause Plaintiff to suffer damages, the exact amount to be determined at trial.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff prays for the following relief:

134. A judgment in favor of Plaintiff that Apple has infringed, directly and indirectly, by way of inducement, literally and/or under the doctrine of equivalents, the patents-in-suit;

135. An award of damages to which Plaintiff is entitled under 35 U.S.C. § 284, 35 U.S.C. § 286, and 35 U.S.C. § 154(d) for Apple's past infringement and any continuing or infringement including post-trial up until the date a final judgment is

entered, including both compensatory damages and treble damages for willful infringement;

136. Plaintiff's actual damages in an amount sufficient to compensate Plaintiff for Apple's infringement of the patents-in-suit until such time as Apple ceases its infringing conduct, including supplemental damages post-verdict.

137. A judgment and order against Apple for exemplary damages as determined by the trier of fact;

138. A judgment that Apple's infringement has been willful;

139. Pre- and post-judgment interest as allowed by law on any damages awarded to Plaintiff;

140. A judgment and order requiring Apple to pay the costs of this action (including all disbursements), as well as attorneys' fees as provided by 35 U.S.C. § 285;

141. A judgment and order requiring Apple to pay to Plaintiff compulsory ongoing licensing fees, as determined by the Court in equity; and

142. Such other and further relief in law or in equity to which Plaintiff may be justly entitled.

DEMAND FOR JURY TRIAL

Plaintiff demands a trial by jury of any and all issues triable of right before a jury.

Dated: April 14, 2023

Respectfully submitted,

/s/ *Alan Block*

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**pro hac vice* application forthcoming

Attorneys for Plaintiff Clear Imaging Research, LLC