

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.;
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner

v.

SLYDE ANALYTICS, LLC
Patent Owner.

**DECLARATION OF BENJAMIN B. BEDERSON
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,198,085**

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I. INTRODUCTION

1. I have been retained by Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, “Samsung” or “Petitioner”), as an independent expert in this proceeding before the Patent Trial and Appeal Board (“PTAB” or “Board”). I understand that Samsung is requesting that the Board institute an *inter partes* review (“IPR”) proceeding of U.S. Patent No. 10,198,085 (“the ’085 Patent”) (Ex-1001), currently assigned to Slyde Analytics LLC (“Patent Owner” or “PO”).

2. I am not and have never been an employee of Samsung. I am being compensated at my usual and customary rate of \$600 per hour. No part of my compensation depends on the outcome of this proceeding, and I have no other interest in this proceeding.

3. I have been asked to provide my independent analysis of the ’085 Patent in light of the prior art publications cited below. I have also been asked to consider the state of the art and prior art available as of October 18, 2011. Based on the prior art discussed in this declaration, it is my opinion that Claims 1-10 of the ’085 Patent are unpatentable for the reasons provided below.

A. Qualifications

4. I am currently Professor Emeritus of Computer Science at the University of Maryland (“UMD”). From 2014 to 2018, I was the Associate Provost

of Learning Initiatives and Executive Director of the Teaching and Learning Transformation Center at the UMD. I am a member and previous director of the Human-Computer Interaction Lab (“HCIL”), the oldest and one of the best known Human-Computer Interaction (“HCI”) research groups in the country. I am the co-founder of the J.S. Bryant School, a therapeutic high school planned to open in 2025. I was also co-founder and Chief Scientist of Zumobi, Inc. from 2006 to 2014, a Seattle-based startup that is a publisher of content applications and advertising platforms for smartphones. I am also co-founder and co-director of the International Children’s Digital Library (“ICDL”), a web site launched in 2002 that provides the world’s largest collection of freely available online children’s books from around the world with an interface aimed to make it easy for children and adults to search and read children’s books online. I was also cofounder and Chief Technology Officer of Hazel Analytics, a data analytics company to improve food safety and better public health whose product sends alerts in warranted circumstances. In addition, I have for more than 25 years consulted for numerous companies in the area of user interfaces, including Hillcrest Labs, Lockheed Martin, Logitech, Microsoft, NASA Goddard Space Flight Center, the Palo Alto Research Center, and Sony.

5. For more than 30 years, I have studied, designed, and worked in the field of computer science and Human-Computer Interaction (HCI). My experience

includes 30 years of teaching and research, with research interests in HCI and the software and technology underlying today's interactive computing systems. This includes the design and implementation of hardware and software systems including graphical user interfaces with capacitive and other touch screen sensors, and interactive applications on a range of devices, including embedded systems, controllers, smart phones, and PDAs.

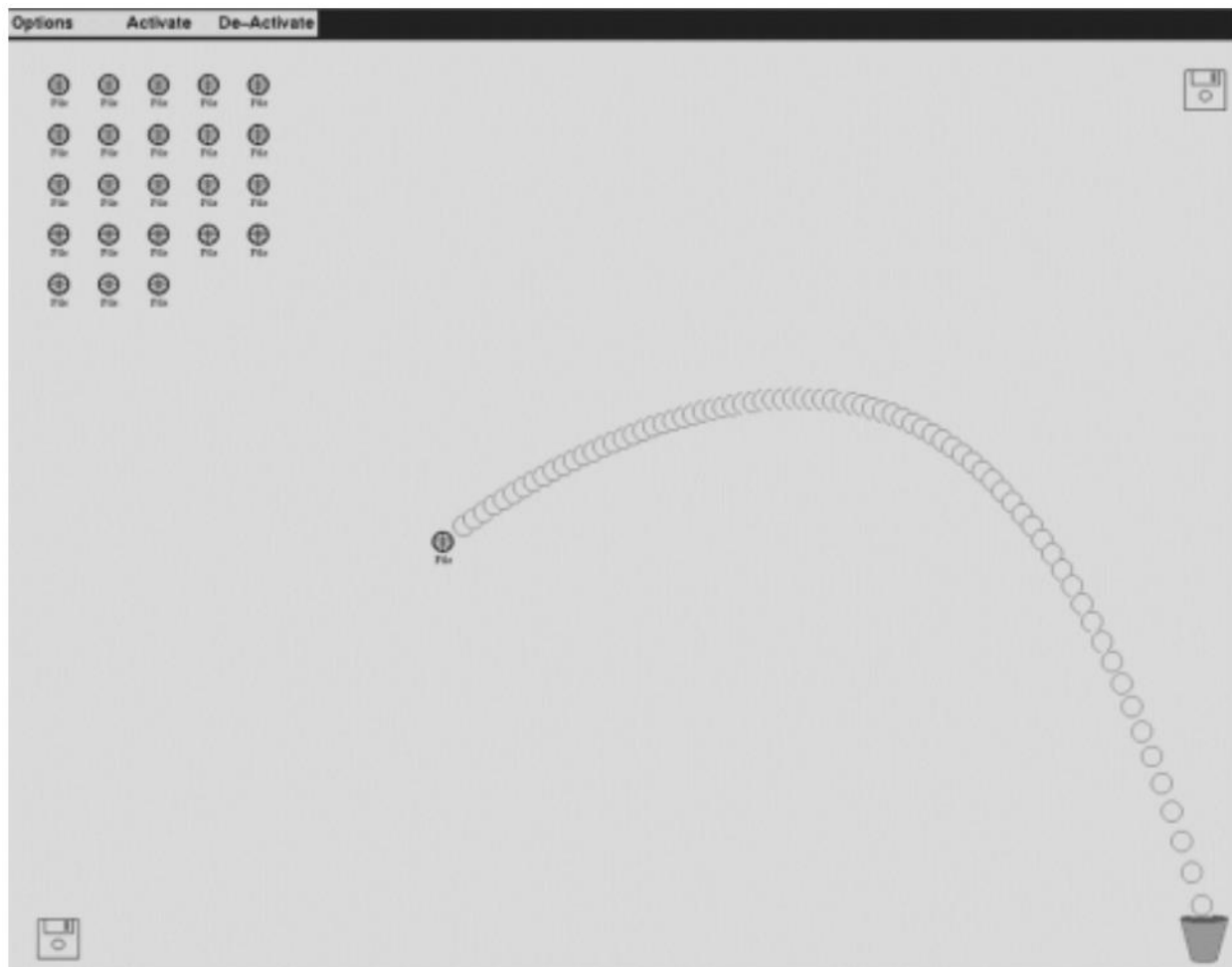
6. At UMD, I am focused primarily on the area of HCI, a field that relates to the development and understanding of computing systems to serve users' needs. Researchers and practitioners in this field are focused on making universally usable, useful, efficient, and appealing systems to support people in their wide range of activities. My approach is to balance the development of innovative technology that serves people's practical needs. Example systems following this approach that I have built include Cortex-I (1992 embedded computer vision system that sensed licensed plates with custom motor, camera and controller), Audio Augmented Reality (1995 embedded system for sensing a user's location and playing audio suited to that location), Fisheye Menus (2000 software for sensing movement within and selection of linear list of items in a menu), PhotoMesa (2001 software for end users to browse personal photos), DateLens (2002 software for end users to use their mobile devices to efficiently access their calendar information), SlideBar (2005 linear sensor to control scrolling), LaunchTile (2005 "home screen" software for

mobile devices to allow users to navigate apps in a zoomable environment), SpaceTree (2001 software for end users to efficiently browse very large hierarchies), ICDL (as described above), and StoryKit (a 2009 iPhone app for children to create stories).

7. Throughout the 1990s and 2000s, I worked on a range of “zoomable user interfaces,” which are systems that support the multi-scale and spatial organization of and magnification-based navigation among multiple documents or visual objects. I built several different “ZUI” systems over the years, including Pad++, Jazz and Piccolo. In those systems, I used a range of solutions to allow users to control zooming through the information space. The most common approach for systems with three button mice was to use the middle button for zooming in and the right button for zooming out. *See* Ex-1023, p. 18. The user would hold the button down, and the system would smoothly animate zooming in or out – so that the user controlled how much the system zoomed based on the duration that the button was pressed. *See id.*, pp. 20, 22.

8. In 1995 and 1996, I supervised graduate student David Rogers and other students in the development of a user interface approach that allowed a user to “toss” an object across long distances on their screen with their mouse. *See* Ex-1024, p. 1. Motivated by increasingly large computer screens, we recognized a need to help users move items long distances without necessarily having to drag the item

that entire distance manually. *See id.* Instead, we calculated the speed and direction that the user dragged an object with their mouse. When a user released the mouse button, if the speed was greater than a threshold, our code calculated the path of where to animate the object based on several factors including the speed and direction of the mouse at the time of mouse button release. The figure below from a paper we wrote in 1996 shows the path of a tossed object. This resulted in David Rogers's master's thesis in 1995 and a paper that we submitted to the 1996 Conference on Human Factors in Computing Systems (CHI 1996).



Exemplar Figure of Tossing.

9. In 1999 and 2000, I worked on a mechanism to address the challenge that users faced when selecting one item from a long menu. As I described in a paper entitled “Fisheye Menus” that I published in the 2000 Proceedings of the ACM Symposium on User Interface Software and Technology, existing techniques typically involved lengthy and slow scrolling techniques. *See* Ex-1025, p. 8. I created an alternative solution that fit all of the elements onto a single screen thereby completely eliminating the need to scroll. *See* Ex-1025, p. 1. This approach used the concept of “fisheye distortion” to shrink some of the elements, while keeping the elements that are under the cursor to be full size so the user could easily see and select them. *See id.* This approach as depicted in the figure below and described further in the paper, was later used in a number of commercial products such as the Apple MacOS Dock.

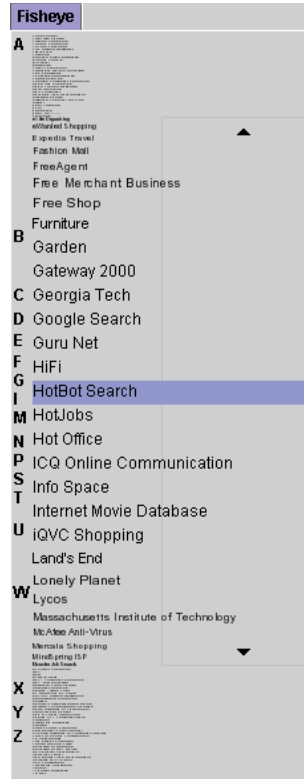


Figure 2.

10. Starting in 2000, I supervised graduate student Leslie Chipman who was working on a general solution to improve the user experience of people scrolling long documents on computers. Our solution relied on a passive haptic physical linear input device we called the “Slidebar.” See Ex-1026, p. 1. The Slidebar was designed to sit on either side of the keyboard to be used with the non-dominant hand for scanning and rough positioning, and then if the user wanted to switch to reading, the dominant hand could be used for more accurate positioning. See *id.* With a physical range of motion of approximately two inches, the full range could be accessed by moving just the fingers without moving the entire hand. See *id.* This

took advantage of human proprioception—the fact that people have excellent ability to know where their body is—and allowed the user to scroll long documents completely eyes-free. *See id.*, p. 4. They did not need to look at the device or the screen to, for example, move a mouse pointer to a graphical scroll bar. Instead, they could focus on their primary task of reading. This work was published in 2004.

11. In April 2000, I visited Professors Wayne Westerman and John Elias at the University of Delaware and gave a talk entitled “Zoomable User Interfaces and Single Display Groupware.” This resulted in a collaboration with Professor Westerman, graduate student Hilary Browne, and others where we used their FingerWorks capacitive Multi-Touch Surface as the input device for a multi-touch finger painting program for children. *See Ex-1027*, p. 1. The project used this input device to support a computer painting program that allowed children to paint with their fingers by directly touching the sensing surface. In contrast to the mouse input more typically used in this time period, this approach enabled us to create a more natural interaction environment. *See id.* This work, depicted in the figure below, was published in a September 2000 technical report.



Figure 1.

12. Throughout the 2000's, I worked on a range of interfaces for mobile devices with a focus on interface design for touch interfaces, including those with capacitive sensors. During this period, it became apparent that some positions on a screen were easier to access than others, especially when used with a single hand. To understand this issue, I led a range of studies that resulted in two papers published in 2006 and 2007. *See, e.g.,* Ex-1028, Ex-1029. The following figure summarizes the results of one of the studies, and shows that generally speaking, when using a single hand, the center of the screens were easier for users to touch than the edges of the screen, and that the corners of the screen were the hardest positions to touch.

Table 2. Preference and movement time maps for each device. Depth of color in columns 1 and 2 indicate stronger user agreement.

	Subjective Difficult Regions	Subjective Easy Regions	Preference -Derived Regions Easy — Medium — Hard —	Data- Derived Regions Fastest — Slowest —
SMALL				
FLIP				
LARGE				
PDA				

Ex-1029, Table 2.

13. This work on touch screen mobile devices led to my creation of Zumobi in 2006, where I was responsible for investigating new software platforms and developing new user interface designs that provide efficient and engaging interfaces to permit end users to access a wide range of content on mobile platforms (including the iPhone and Android-based devices). For example, I designed and implemented

software called “Ziibii,” a “river” of news for iPhone that used a capacitive sensor for controlling linear movement through news; software called “ZoomCanvas,” a zoomable user interface for several iPhone apps; and iPhone apps including “Inside Xbox” for Microsoft and Snow Report for REI. At the ICDL, I have since 2002 been the technical director responsible for the design and implementation of the web site, www.childrenslibrary.org (originally at www.icdlbooks.org). In particular, I have been closely involved in designing the user interface as well as the software architecture for the web site since its inception in 2002.

14. Throughout my design, development, and study of mobile systems, I was aware of and considered the impact of my work on the power usage and battery life of the device. In fact, going back to a miniaturized computer vision system I built as part of my dissertation, I considered power usage of the systems I built. For example, a 1995 paper I wrote described a mobile computer system including a movable camera explaining that it takes up less than “a third of a cubic foot” and that the “long-range goal of this project is to demonstrate that major new applications of robotics will become feasible when small, low-cost, machine-vision systems can be mass produced. Ex-1051, 101. We use the term ‘commodity robotics’ to express the expected impact of the possibilities for opening up new application niches in robotics and machine vision, for what has until now been an expensive, and therefore limited, technology.” *Id.* While the prototype I built was plugged in for power, I

measured its power usage with the recognition that it would be suitable to develop a battery powered version. “The system is powered from a standard 110-volt AC line, but uses less than 25 watts and could be battery powered.” *Id.*, 103.

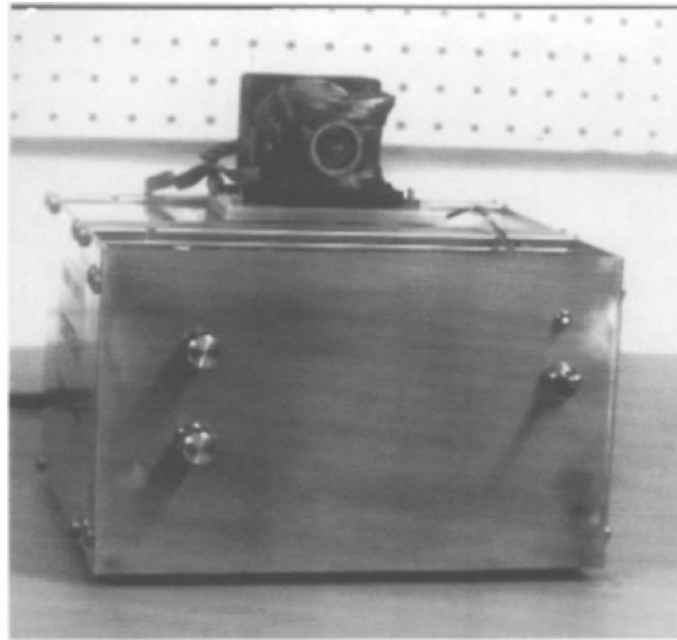


Fig. 1. Cortex-I: a prototype of a miniaturized, active vision system

15. I published a 2010 paper that used an integrated accelerometer in a mobile device that used tilt to select a command along the direction of movement. The middle images in the figure below show how a rectangle could be selected by tilting that would then apply a visual format to text. As I explained in the paper, “[g]estures exceeding 30 degree changes from a continually updated ‘neutral’ position were recognized as a command along the direction of movement.” Ex-1035, 21.

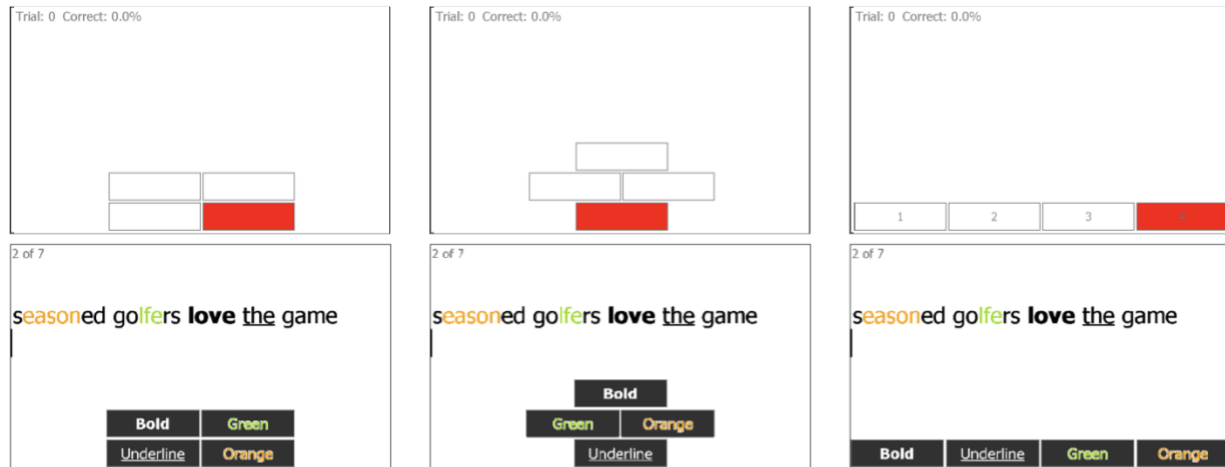


Figure 2. The software interface for the Target Selection (top) and Text Formatting (bottom) tasks. Presented are the Foot (left), Tilt (middle) and Touch/Voice (right) interfaces. The target to select for the Target Selection task is red. The phrase used in the Text Formatting task includes all four formats: 'eason' is orange; 'lfe' is green; 'love' is bold; and 'the' is underlined.

16. Beginning in the mid-1990s, I have been responsible for the design and implementation of numerous other web sites in addition to the ICDL. For example, I designed and built my own professional web site when I was an Assistant Professor of Computer Science at the University of New Mexico in 1995 and have continued to design, write the code for, and update both that site (which I moved to the UMD in 1998, currently at <http://www.cs.umd.edu/~bederson/>) as well as numerous project web sites, such as Pad++, <http://www.cs.umd.edu/hcil/pad++/>. I received the Janet Fabri Memorial Award for Outstanding Doctoral Dissertation for my Ph.D. work in robotics and computer vision. I have combined my hardware and software skills throughout my career in HCI research, building various interactive electrical and mechanical systems that couple with software to provide an innovative user experience.

17. My work has been published extensively in more than 160 technical publications, and I have given about 100 invited talks, including 9 keynote lectures. I have won a number of awards including the Brian Shackel Award for “outstanding contribution with international impact in the field of HCI” in 2007, and the Social Impact Award in 2010 from the Association for Computing Machinery’s (“ACM”) Special Interest Group on Computer Human Interaction (“SIGCHI”). ACM is the primary international professional community of computer scientists, and SIGCHI is the primary international professional HCI community. I have been honored by both professional organizations. I am an “ACM Distinguished Scientist,” which “recognizes those ACM members with at least 15 years of professional experience and 5 years of continuous Professional Membership who have achieved significant accomplishments or have made a significant impact on the computing field.” I am a member of the “CHI Academy,” which is described as follows: “The CHI Academy is an honorary group of individuals who have made substantial contributions to the field of HCI. These are the principal leaders of the field, whose efforts have shaped the disciplines and/or industry and led the research and/or innovation in human-computer interaction.” The criteria for election to the CHI Academy are: (1) cumulative contributions to the field; (2) impact on the field through development of new research directions and/or innovations; and (3) influence on the work of others. I have received two “Test of Time” awards from

IEEE InfoVis for my 2001 and 2002 work on visualizing hierarchies, including those containing digital photos.¹

18. I have appeared on radio shows numerous times to discuss issues relating to user interface design and people's use and frustration with common technologies, web sites, and mobile devices. My work has been discussed and I have been quoted by mainstream media around the world over 120 times, including by the New York Times, the Wall Street Journal, the Washington Post, Newsweek, the Seattle Post Intelligencer, the Independent, Le Monde, NPR's All Things Considered, New Scientist Magazine, and MIT's Technology Review.

19. I have designed, programmed, and publicly deployed dozens of user-facing software products that have cumulatively had millions of users. My work is cited by several major companies, including Amazon, Apple, Facebook, Google, and Microsoft. I am a named inventor on 14 U.S. patents and 20 U.S. patent applications. The patents are generally directed to user interfaces/experience.

20. I am over 18 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth herein. I understand that a copy of my current curriculum vitae, which details my education and professional and academic experience, is being submitted by Petitioner as Exhibit 1003. The

¹ See Ex-1030; Ex-1031

following provides an overview of some of my experience that is relevant to the matters set forth in this declaration.

21. I received a B.S. degree in Computer Science with a minor in Electrical Engineering in 1986 from the Rensselaer Polytechnic Institute. I received M.S. and Ph.D. degrees in Computer Science in 1989 and 1992, both from New York University.

22. Based on my experience and education, I believe that I am qualified to opine as to the knowledge and level of skill of one of ordinary skill in the art at the time of the alleged invention of the '085 Patent, as well as the state of the art at that time.

B. Materials Considered

23. In forming my opinions, I reviewed the following documents, in addition to others I have cited in my declaration. I also relied on my own knowledge of and experience in the field of touch-screen interfaces for electronic devices.²

Ex. No.	Description
Ex-1001	U.S. Patent No. 10,198,085 (“the '085 Patent”)
Ex-1003	Curriculum Vitae of Dr. Benjamin B. Bederson
Ex-1004	Prosecution History of the '085 Patent (Application No. 15/799,608)

² Four-digit pin citations that begin with 0 are to the branded numbers added by Samsung in the bottom right corner of the exhibits. All other pin citations are to original page, column, paragraph, or line numbers.

Ex. No.	Description
Ex-1005	U.S. Patent Application Publication No. US 2009/0164219 (“Yeung”)
Ex-1006	U.S. Patent No. 8,228,292 (“Ruiz”)
Ex-1007	U.S. Patent Application Publication No. US 2011/0148752 (“Alameh”)
Ex-1008	Mark Joselli and Esteban Clua, gRmobile: A Framework for Touch Accelerometer Gesture Recognition for Mobile Games, IEEE 141-150 (2010).
Ex-1009	U.S. Patent No. 8,615,375 (“Yano”)
Ex-1010	U.S. Patent Application Publication No. 2009/0195497 (“Fitzgerald”)
Ex-1011	U.S. Patent Application Publication No. 2011/0264928 (“Hinckley”)
Ex-1012	U.S. Patent Application Publication No. 2008/0229255 (“Linjama”)
Ex-1013	U.S. Patent Provisional Application No. 61/320,663 (“Ruiz Provisional”)
Ex-1014	Certified Translation of Japanese Patent Application Publication No. JP2007-41143 (“Nishijima”)
Ex-1015	Certified Translation of Japanese Patent Application Publication No. JP2010-262341 (“Shimazaki”)
Ex-1016	Certified Translation of Chinese Patent Application Publication No. CN101458557 (“Zhenghao”)
Ex-1017	U.S. Patent No. 5,612,931 (“Sato”)
Ex-1018	Thomas Schlömer, et. al, “Gesture Recognition with a Wii Controller,” Proceedings of the Second International Conference on Tangible and Embedded Interaction, February 18-20 2008 (“Schlömer”)

Ex. No.	Description
Ex-1019	U.S. Patent No. 7,873,849 (“Mucignat”)
Ex-1020	U.S. Patent 9,122,735 (“Locker”)
Ex-1021	U.S. Patent Application Publication No. US 2010/0013778 (“Liu”)
Ex-1022	Seungyon Claire Lee, Bohao Li, and Thad Starner, AirTouch, Synchronizing in-air hand gesture and on-body tactile feedback to augment mobile gesture interaction 3-10 (2011).
Ex-1023	Benjamin B. Bederson & James D. Hollan, Pad++: A Zooming Graphical Interface for Exploring Alternate Interface Physics 17-26 (1994).
Ex-1024	David Rogers, Feimo Hou, Chandelle Vuolo & Benjamin B. Bederson, Tossing Objects in a Desktop Environment (1996).
Ex-1025	Benjamin B. Bederson, Fisheye Menus 217-225 (2000).
Ex-1026	Leslie E Chipman, Benjamin B. Bederson & Jennifer A. Golbeck, SlideBar: Analysis of a linear input device 1-9 (2004).
Ex-1027	Hilary Browne et al., Designing a Collaborative Finger Painting Application for Children (2000).
Ex-1028	Pekka Parhi, Amy K. Karlson & Benjamin B. Bederson, Target Size Study for One-Handed Thumb Use on Small Touchscreen Devices 203-210 (2006).
Ex-1029	Amy K. Karlson, Benjamin B. Bederson & José Contreras-Vidal, Understanding One-Handed Use of Mobile Devices 1-22 (2007).
Ex-1030	Test of Time Awards, VIS2021, https://ieevis.org/year/2021/info/awards/test-of-time-awards (last visited Oct. 3, 2023).

Ex. No.	Description
Ex-1031	Test of Time Awards, VIS2022, https://ieevis.org/year/2022/info/awards/test-of-time-awards (last visited Oct. 3, 2023).
Ex-1032	Swiss Patent Application No. 01689/11 (“911 Application”)
Ex-1033	U.S. Patent Application Publication No. 2009/0265671 (“Sachs”)
Ex-1034	World Intellectual Property Organization Publication No. WO 2006/120211 (“Tecchiolli”)
Ex-1035	David Dearman, Amy Karlson, Brian Meyers, and Ben Bederson, Multi-Modal Text Entry and Selection on a Mobile Device 19-26 (2011).
EX-1036	Mercedes Casamayor and Claire Croke, How to Save Power in Battery Applications Using the Power-Down Mode in an ADC, Analog Dialogue (2003), https://www.analog.com/media/en/analog-dialogue/volume-37/number-3/articles/save-power-with-power-down-mode.pdf .
Ex-1037	Eija Kaasinen, User acceptance of mobile services: Value, ease of use, trust and ease of adoption, VTT Technical Research Centre of Finland (June 22, 2005).
Ex-1038	Beverly L. Harrison, Kenneth P. Fishkin, Anuj Gujar, Carlos Mochon, and Roy Want, Squeeze Me, Hold Me, Tilt Me! An Exploration of Manipulative User Interfaces, CHI ’98: Proceedings of the SIGHI Conference on Human Factors in Computing Systems 17-24 (1998).
Ex-1039	Lynn Michelle Roylance and James B. Angell, A Batch-Fabricated Silicon Accelerometer, IEEE 1911-1917 (1979).
Ex-1040	William A.S. Buxton, A three-state model of graphical input, IFIP TC13 International Conference on Human-Interaction 449-456 (1990).

Ex. No.	Description
Ex-1041	J.F. Barlett, Rock 'n' Scroll is here to stay [user interface], IEEE 40-45 (2000).
Ex-1042	12-Bit, 200kHz, micropower Sampling Analog-to-Digital Converter, ADS7822, Burr-Brown Products from Texas Instruments (2007).
Ex-1043	MSOP-8 Package Information, Diodes Incorporated (2021), https://www.diodes.com/assets/Package-Files/MSOP-8.pdf .
Ex-1044	Standard Red T-1 ¾ Solid State Lamps, MV5052, MV5053/6053, MV5054A-1/2/3, MV5055, Fairchild Semiconductor (2002).
Ex-1045	+1.5 g Dual Axis Micromachined Accelerometer, MMA6260Q, MMA6261Q, MMA6262Q, MMA6263Q, Motorola Semiconductor Technical Data (2004).
Ex-1046	IEEE Declaration of Gordon MacPherson regarding Ex-1008, Joselli reference.
Ex-1047	Screenshot of https://ieeexplore.ieee.org/document/5479100 (accessed on Oct. 13, 2023)
Ex-1048	Ivan Raso, Ramon Hervas, and Jose Bravo, m-Physio: Personalized Accelerometer-based Physical Rehabilitation Platform 416-421 (2010).
Ex-1049	Liyanaarachchi Lekamalage Chamara Kasun, Wooi-Boon Goh, Accelerometer-based swinging gesture detection for an electronic handbell, IEEE 272-277 (2011).
Ex-1050	World Intellectual Property Organization Publication No. WO 2012/001464 A1 ("Lundin")
Ex-1051	Benjamin B. Bederson, Richard S. Wallace, and Eric Schwartz, A miniaturized space-variant active vision system: Cortex-I, Machine Visions and Applications 101-109 (1995).
Ex-1052	U.S. Patent No. 5,754,176 ("Crawford")

Ex. No.	Description
Ex-1053	Pocket PC User's Guide, Casio
Ex-1054	Shwetak N. Patel, Jeffrey S. Pierce, and Gregory D. Abowd, A gesture-based authentication scheme for untrusted public terminals, UIST '04: Proceedings of the 17th annual ACM symposium on User interface software and technology 157-160 (2004).
Ex-1055	Java version history, Wikipedia, https://en.wikipedia.org/wiki/Java_version_history .
Ex-1056	3-Axis, +2 g/+4 g/+8 g/+16 g, Digital Accelerometer, ADXL345, Analog Devices.
Ex-1057	Linux Watch, https://researcher.watson.ibm.com/researcher/view_group_subpage.php?id=6102 (last visited Sept. 29, 2023).
Ex-1058	Chandra Narayanaswami et al., IBM's Linux Watch: The Challenge of Miniaturization 33-41 (2002).

II. LEGAL STANDARDS

24. In forming my opinions and considering the subject matter of the '085 Patent and its claims in light of the prior art, I am relying on certain legal principles that counsel in this case explained to me. My understanding of these concepts is summarized below.

25. I understand that earlier publications and patents may act to render a patent unpatentable for one of two reasons: (1) anticipation, and (2) obviousness.

A. Anticipation

26. It is my understanding that the claims of a patent are anticipated by a prior art reference if each and every element of the claim is found either explicitly or inherently in the reference. I understand that inherency requires a showing that the missing descriptive matter in the claim is necessarily present in the allegedly anticipating reference, and that it would have been so recognized by a person of ordinary skill in the art (“POSITA”).

27. I understand that when a challenged claim covers several structures, either generically or as alternatives, the claim is deemed anticipated if any of the structures within the scope of the claim is found in the prior art reference.

28. Although anticipation typically involves the analysis of a single prior art reference, I understand that additional references may be used to show that the prior art reference has enabling disclosure (i.e., allows a POSITA to make the invention without undue experimentation), to explain the meaning of a term used in the prior art reference, and/or to show that a characteristic is inherent in the prior art reference.

B. Obviousness

29. I understand that a claim is invalid as obvious if it would have been obvious to a person of ordinary skill in the art at the time the alleged invention was made. This means that even if all of the elements of the claim cannot be found in a

single prior art reference that would anticipate the claim, a person of ordinary skill in the art who was aware of the prior art would have been able to come up with the claimed invention. This may be the case, for example, where the missing element represents only an insubstantial different over the prior art or a reconfiguration of a known system. I understand that in an obviousness determination, the person of ordinary skill in the art is presumed to have knowledge of all material prior art.

30. I understand that an obviousness analysis requires an understanding of the scope and content of the prior art, any differences between the alleged invention and the prior art, and the level of ordinary skill in evaluating the pertinent art.

31. I understand that when a product is available, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill in the art can implement a predictable variation, obviousness likely bars its patentability. For the same reason, if a technique has been used to improve one device and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique would have been obvious.

32. I understand that whether a prior art reference renders a patent claim unpatentable as obvious is determine from the perspective of a person of ordinary skill in the art at the time of the alleged invention. I have been told that there is not requirement that the prior art contain an express suggestion to combine known

elements to achieve the claimed invention, but a suggestion to combine known elements to achieve the claimed invention may come from the prior art, as filtered through the knowledge of one skilled in the art. In addition, I have been told that the inferences and creative steps a person of ordinary skill in the art would employ are relevant to the determination of obviousness.

33. I understand that one may consider, e.g., whether (1) the change was merely the predictable result of using prior art elements according to their known functions, or whether it was the result of true inventiveness; (2) there is some teaching or suggestion in the prior art to make the modification or combination of elements claimed in the patent; (3) the claimed innovation applies a known technique that had been used to improve a similar device or method in a similar way; (4) the claimed invention would have been obvious to try, meaning that the claimed innovation was one of a relatively small number of possible approaches to the problem with a reasonable expectation of success by those skilled in the art; (5) the invention merely substituted one known element for another known element in order to obtain predictable results; (6) the invention merely applies a known technique to a known device, method, or product to yield predictable results; or (7) known work in one field of endeavor may have prompted variations of it for use in either the same field or a different one based on design incentives or other market forces that would have been predictable to a person of ordinary skill in the art.

34. I further understand that certain factors may support or rebut the obviousness of a claim. I understand that such secondary considerations include, among other things, commercial success of the patented invention, skepticism of those having ordinary skill in the art at the time of the invention, unexpected results of the invention, any long-felt but unsolved need in the art that was satisfied by the alleged invention, the failure of others to make the alleged invention, praise of the alleged invention by those having ordinary skill in the art, and copying of the alleged invention by others in the field. I understand that there must be a nexus—that is, a connection—between any such secondary considerations and the alleged invention. I also understand that contemporaneous and independent invention by others is a secondary consideration tending to show obviousness.

35. I am not aware of any allegations by the named inventor of the '085 Patent or any assignee of the '085 Patent that any secondary considerations tend to rebut the obviousness of the '085 Patent.

36. Additionally, I understand that in considering obviousness, it is important not to use the benefit of hindsight derived from the patent under consideration.

C. Level of Ordinary Skill in the Art

37. When interpreting a patent, I understand that it is important to identify the relevant art pertaining to that patent, as well as the level of ordinary skill in that

art at the time of the claimed invention. The “art” is the field of technology to which the patent is related.

38. I am informed and understand that the POSITA is a hypothetical person who is presumed to know the relevant prior art. I understand that the actual inventor’s skill is not determinative of the level of ordinary skill. I further understand that factors that may be considered in determining level of skill include: (i) the types of problems encountered in the art; (ii) prior art solutions to those problems; (iii) the rapidity with which innovations are made; (iv) the sophistication of the technology; and (v) the educational level of active workers in the field. I understand that not all such factors may be present in every case, and one or more of them may predominate.

39. I understand that a POSITA is one who is presumed to be aware of all pertinent art, thinks along conventional wisdom in the art, and is a person of ordinary creativity.

40. A person of ordinary skill in the art at the relevant time, which I have been told to consider as October 18, 2011 (“POSITA”) would have had a bachelor’s degree in electrical engineering, computer science, computer engineering, or a related field, and two-three years of experience in the research, design, development, or testing of user interfaces, inertial sensors, and human-computer interaction in mobile devices, with additional education substituting for experience and vice versa.

41. Based on my education and experience, I would have, at least, met the criteria for a POSITA on October 18, 2011, and I still exceed it today.

D. Claim Construction

42. I understand that the United States Patent and Trademark Office interprets claim terms in an *inter partes* review proceeding under the same claim construction standard that is used in a United States federal court. I understand that under this standard, the meaning of claim terms is considered from the viewpoint of a POSITA at the time of the alleged invention.

43. I have been informed that claim terms are generally given their ordinary and customary meaning as understood by one of ordinary skill in the art in light of the specification and the prosecution history pertaining to the patent. I understand, however, that claims terms are generally not limited by the embodiments described in the specification.

44. I understand that in addition to the claims, specification, and prosecution history, other evidence may be considered to ascertain the meaning of claim terms, including textbooks, encyclopedias, articles, and dictionaries. I have been informed that this other evidence is often less significant and less reliable than the claims, specification, and prosecution history.

III. SUMMARY OF GROUNDS

45. I understand that Petitioner challenges the validity of Claims 1-10 of the '085 Patent. It is my opinion that the following grounds demonstrate that the claims of the '085 Patent are invalid:

Ground	Summary
1	Claims 1-10 are obvious over Yeung (Ex-1005) combined with Ruiz (Ex-1006)
2	Claims 1-4, 6, and 8-10 are obvious over Yeung combined with Alameh (Ex-1007) and further combined with Joselli (Ex-1008)
3	Claims 5 and 7 are obvious over Yeung combined with Alameh and Joselli and further combined with Yano (Ex-1009)

IV. THE '085 Patent

A. Overview of the '085 Patent

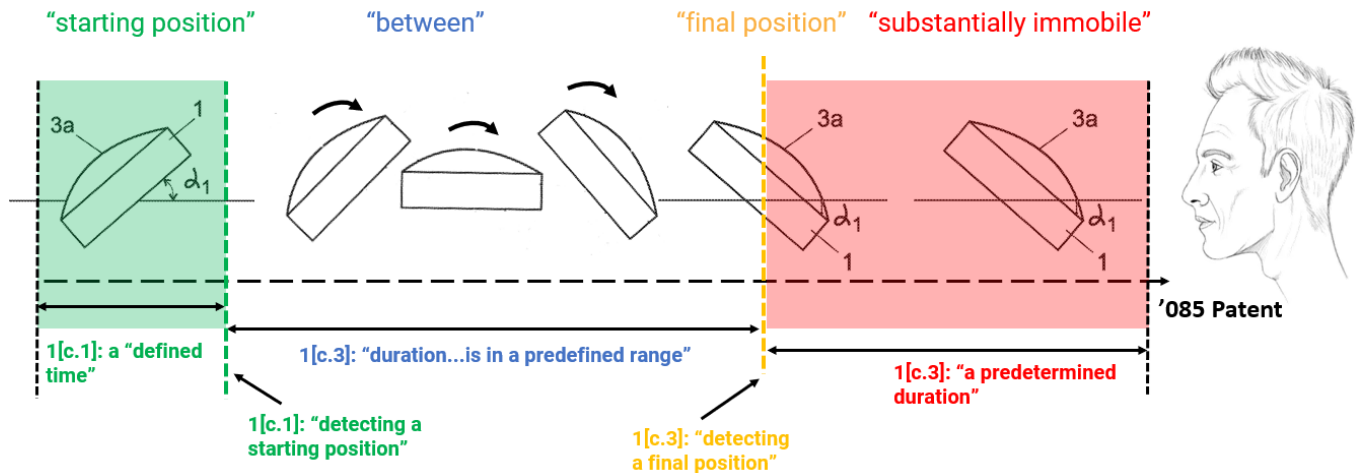
46. The '085 Patent, titled “Method and Circuit for Switching a Wristwatch from a First Power Mode to a Second Power Mode,” is directed to an “electronic wristwatch operable in two power modes.” Ex-1001 at Cover. The '085 Patent admits that wristwatches having a touch panel where the display is switched into a sleep mode when not in use were known in the art, including watches that could

detect gestures using accelerometers, including gestures used to wake up a wristwatch. Ex-1001, 1:24-32; 1:43-54.

47. The '085 Patent alleges that “different methods are known in order to switch on a device in sleep mode,” but “it is difficult to distinguish between intentional commands to switch a device and other gestures or accelerations which may be produced during normal use of the device.” Ex-1001, 2:8-12. Accordingly, the '085 Patent purports to improve on the prior art by “provid[ing] a better method for switching a device, such as a microelectronic device, into a different power mode ... without causing unwanted power mode switches.” Ex-1001, 2:19-24.

48. The '085 Patent presents a method of performing a mode change by detecting “a wristturn detection is performed for detecting rotation of the wrist and deciding if this rotation corresponds to a predefined pattern, in which case the wristwatch should be switched to a second power mode for example in order to activate the display.” *Id.*, 9:38-42. In this embodiment, a wristwatch uses an accelerometer to detect a wristturn and, in response, switches power modes. As shown in Figures 7A-7C³ below, the claimed wristturn must be performed in a particular manner in order to be interpreted as indicating a desire to change power modes.

³ Throughout this Declaration, I have annotated figures using color.



Ex-1001, Figs. 7a (left) and 7b/7c (right). The images in the middle, rotation arrows, and face have been added to illustrate the timing and orientation requirements for Claim 1's wristturn.

49. The sole independent claim follows this same pattern, as shown in my annotations above. It recites:

1. A method for switching a wristwatch from a first power mode to a second power mode, comprising:

- [a] using an accelerometer for detecting a wristturn, and
- [b] switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected,
- [c] wherein said step of detecting a wristturn comprises:
 - [c.1] detecting that an orientation of the wristwatch is in a starting position, wherein said step of detecting that the orientation is in the starting position comprises detecting that the orientation of the wristwatch is held within a first range for a defined time;
 - [c.2] detecting that an orientation of the wristwatch is then in a final position, wherein said step of detecting that the orientation is in the final position comprises detecting that

the orientation is in a second range different from said first range,

[c.3] in response to a detection that the orientation of the wristwatch is in the second range, detecting that the wristwatch remains substantially immobile during a predetermined duration and that a duration between the starting position and the final position is in a predefined range.

Ex-1001, 10:59-11:15.

50. According to both the claim and the specification, the wristwatch must first be detected in a “starting position,” as recited in the first sub-element of limitation 1[c] when the wristwatch is held in an orientation within an angle range for “a defined time” (e.g., 50 ms). Ex-1001, 9:61-63. The starting position is shown in Figure 7a, which depicts a wristwatch in “a first defined angle range α_1 (e.g., 25° to 155° relative[] to the horizontal),” where positive angles are understood to indicate rotation away from the user’s face. Ex-1001, 9:58-61.

51. The next sub-element of 1[c] requires the wristwatch to be detected in a “final position,” where the wristwatch is in an orientation range that differs from the range used to detect the starting position. Figure 7b shows the final position in which “the wristwatch has been rotated and reaches a final position in a second defined angle range α_1 (e.g. -25° to -75° relative[] to the horizontal).” Ex-1001, 10:4-7. The final position “is a typical position for reading the time on the watch, with the display oriented towards the face of the user.” *Id.*, 10:7-9.

52. In response to being detected in this orientation, the final sub-element of 1[c] requires further detecting (1) that the “duration between the starting position and the final position” is in “a predefined range,” and (2) that the device be held substantially immobile during a “predetermined duration.” *Id.*, 10:9-20. Upon completing these steps, the wristwatch switches to a second power mode.

53. The '085 Patent frames the claimed invention as an advancement over the prior art due to alleged improvements in distinguishing “between intentional commands to switch a device and other gestures or accelerations which may be produced during normal use of the device.” *Id.*, 2:9-13. But for the reasons set forth below, the claims are directed to predictable combinations of well-known prior-art elements in mobile devices.

B. Prosecution History of the '085 Patent

54. I understand the '085 Patent was filed October 31, 2017, as a continuation of international patent application PCT/EP2012/070273, filed October 12, 2012. Ex-1001, cover. I also understand the '085 Patent claims priority to Swiss patent application CH2011/1689, filed October 18, 2011 (“’911 Application,” Ex-1032).

55. I have reviewed the '911 Application and note that it does not contain any disclosure regarding detecting a wristturn but instead is instead directed to using an inertial sensor to detect interactions *with the cover glass* in order to switch

between power modes. Ex-1032 ¶¶8-14. The '911 Application never uses the word “wristturn” or the words “wrist turn” and never teaches that a movement pattern not involving interaction with the cover glass could be a trigger for switching between power modes as is claimed by the '085 Patent. Thus, the '911 Application does not describe the invention claimed by the '085 Patent in sufficient detail such that a POSITA could reasonably conclude that the inventor had possession of the invention claimed by the '085 Patent. Nor do any of the originally-filed claims or any other portion of the specification lead to such a conclusion. For example, the '911 Application omits Figures 7a-7c and the accompanying description of those figures.

56. During prosecution of the application that led to the '085 Patent, the examiner issued a single rejection based on US 2009/0195497 (“Fitzgerald,” Ex-1010) and US 2011/0264928 (“Hinckley,” Ex-1011), among other references. Ex-1004, 131-142. The examiner explained that “Fitzgerald discloses a method for switching a wristwatch from a first power mode to a second power mode...using an accelerometer for detecting a wristturn ... and switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected.” Ex-1004, 133 (citing Fitzgerald at [0043], [0045]-[0050], Figs. 3-5). The examiner also noted that Fitzgerald disclosed particular starting and final orientation ranges but did not disclose that the “wristwatch remains substantially immobile during a predetermined duration.” *Id.* at 134 (citing Fitzgerald, [0048], [0064]).

57. The examiner found that it would have been obvious to combine Fitzgerald with Hinckley, which discloses detecting an orientation of a mobile device is in a predefined range, and further “detecting that the mobile device remains substantially immobile during a predetermined duration.” *Id.* (citing Hinckley, [0130]-[0131].). The examiner further found that the combination rendered obvious claims related to specific angle ranges for the first and second orientation ranges, that the wristwatch would be held within a particular range for a particular time of 50 ms, that the watch would be oriented toward the face of the user in the second range. Ex-1004, 134-137.

58. The examiner relied on a third reference, US 2008/0229255 (“Linjama,” Ex-1012) for the limitation, then in a dependent claim, requiring “detecting that the orientation of the wristwatch is held within [the] first range for a defined time.” Ex-1004, 137. The examiner explained that Linjama taught a device that switched between a downward and upward orientation and detecting these orientations required detecting that the orientation was held for a defined time. Ex-1004, 138. Accordingly, the examiner concluded that “[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to use the teachings of Linjama in the invention of Fitzgerald in view of Hinckley for defining a gesture by placing a wristwatch in a non-viewable angle range for a first predefined time and then placing the wristwatch in a viewable angle range for a second

predefined time” because the predefined gesture “provides reliable detection of user intent and allows the user to activate a component of a mobile terminal.” *Id.* (citing Linjama at [0006].).

59. In response to this office action, the applicant conducted an interview with the examiner on August 31, 2018 and on that basis amended several claims to overcome the cited art. Ex-1004, 169-177. In particular, the applicants’ amendments required detecting certain time durations in different orientations as part of detecting a wristturn, such as “detecting that the orientation of the wristwatch is held within a first range for a defined time,” and “that a duration between the starting position and the final position is in a predefined range.” Ex-1004, 170, 173.

60. The applicant argued that Fitzgerald fails to disclose switching between power modes based on the steps of (i) detecting a starting position in a particular orientation range, held for a defined time; (ii) in response to a detection that a wristwatch is in a second range, detecting that it remains substantially immobile during a predetermined duration, and (iii) in response to a detection that the orientation of the wristwatch is in the second range, detecting that a duration between the starting position and final position is in a predefined range. Ex-1004, 174. The applicant argued that these features resulted in the ability to “filter out movements of the wristwatch that are not likely induced by a natural gesture of the user for consulting a watch but also due to (other) human activities such as swinging

movements, small movements, too slow or too fast movements. *Id.*, 174-175. The applicant also distinguished Hinckley, Linjama, and other cited references based on the amended claims. *Id.*, 175-177.

61. The examiner then allowed the claims in a Notice of Allowance dated November 20, 2018. Ex-1004, 192-198. The examiner noted that the cited prior art did not disclose the amended claims and particularly emphasized the requirement of detecting the orientation be in a first range for a period of time and that the duration between the starting and final positions be in a predefined range. *Id.*, 197.

62. The prior art I apply to the claims in my declaration was not before the USPTO during prosecution of the '085 Patent. And as I discuss below, this art discloses the '085 Patent's claims, including the features the applicant contended were new. Thus, my declaration presents substantially new arguments that were not considered during prosecution.

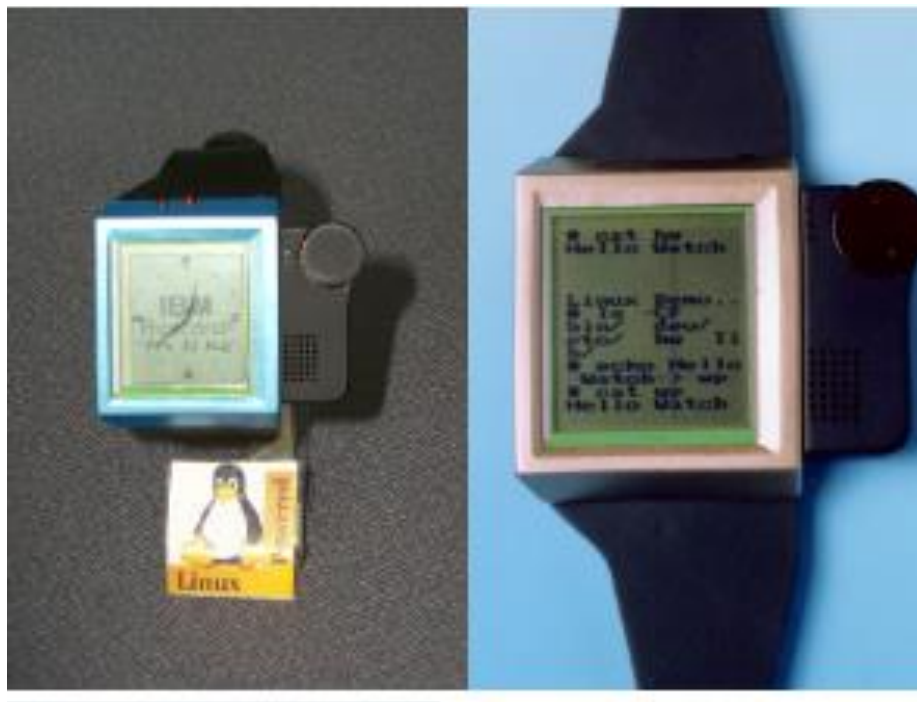
V. TECHNOLOGY BACKGROUND

63. To provide background for the element-by-element analysis of the claims to follow, I present an overview of the state of the art existing at the time of the alleged invention relating to power management and accelerometer-based movement detection in portable electronic devices, including watches. As I will describe from a high-level functional perspective, in the next section based on specific prior art, and then in subsequent sections on a limitation-by-limitation basis,

all of these technologies and techniques were well-known to those of ordinary skill in the art at the time of the alleged invention claimed in the '085 Patent, and a POSITA would have readily understood the combination of elements of Claim 1-10 to have been obvious.

A. Incorporating features of other types of electronic devices into wristwatches

64. By the time of the '085 Patent, it was well-known to take functionalities such as touchscreens and input sensors found in larger electronic devices such as palm pilots and cellular phones and incorporate them into smaller form factors, such as wristwatches. For example, by 2001, IBM had introduced a prototype wristwatch with a touch-sensitive digital matrix LCD screen running the Linux operating system, as shown below. Ex-1057, Ex-1058.



65. The IBM Linux watch was a highly capable device and included a “touch sensitive LCD display 96x120 pixels” and a powerful processor capable of running the Linux operation system version 2.2 and supporting X11 R6 graphics. Ex-1057, 2-3. IBM reported that the “watch will provide users with calendar, address book, and to-do list functions.” *Id.*, 2. As IBM stated in a 2002 IEEE article about the Linux watch, “Our work has convinced us that a lot of functionality can be squeezed into small devices.” Ex-1058, 9. Thus, by the early 2000s, a POSITA would have understood that adapting capable touch-screen interfaces and other methods of user input for use in the form factor of a watch was not only possible but had also been successfully achieved.

66. This knowledge is also reflected in patents from that time period. For example, U.S. Patent No. 8,344,998 (“Fitzgerald,” Ex-1010) with an early 2008 priority date, describes a small electronic watch with a “body 16 that houses a plurality of layers, including an integrated display 18 (which may be a touchscreen) and a movement subassembly 20, for displaying information, including time.” Ex-1010 ¶18.

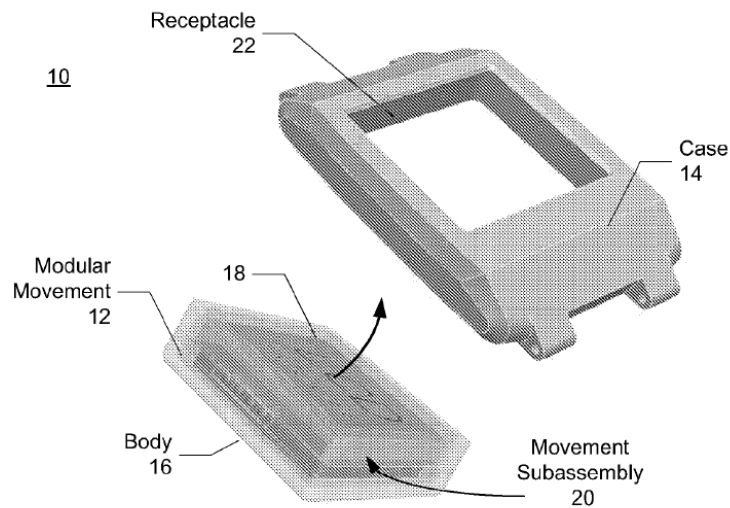


FIG. 1A

67. As another example, World Intellectual Property Organization Publication No. WO 2006/120211 (“Tecchiolli,” Ex-1034) discloses “an energy saving device associated with a portable electronic apparatus, in particular of the so-called ‘wearable’ type.” Ex-1034, 1:4-6. The “portable electronic device” of Tecchiolli is a watch “to be worn on the arm or wrist, in order to allow the user to operate efficiently with free hands,” as shown in Figure 2, below. Ex-1034, 2:12-14, Fig. 2; *see also id.*, 4:28-31 (“...an energy saving device according to the invention is associated with a portable electronic apparatus, such as for example a wrist-wearable system able to be worn on an operator’s arm.”).

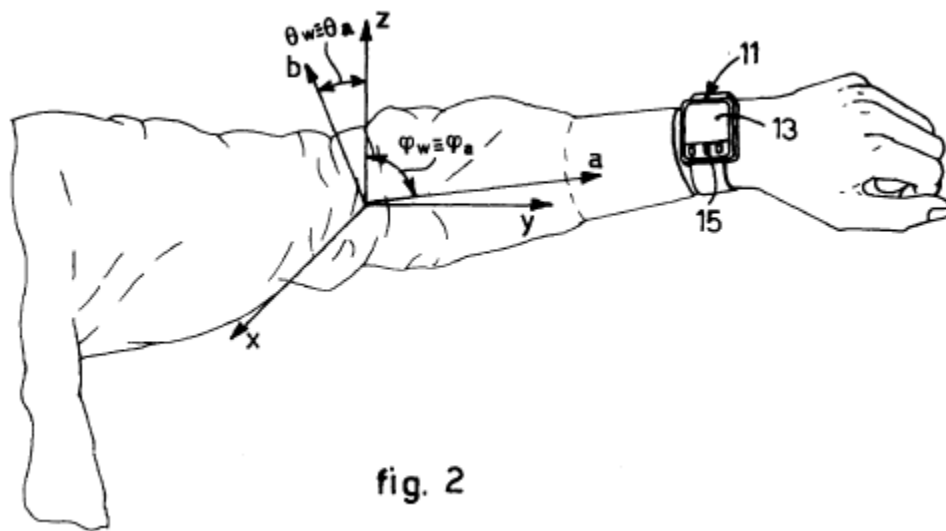


fig. 2

68. Tecchiolli explains that “there is growing demand” for portable electronic devices with significant computing power previously reserved for larger electronic devices:

This type of portable electronic apparatuses, for the normal functional requirements of transportability, must have characteristics of small size, limited weight, and high feed autonomy. Moreover, there is a growing demand, on the part of users, to implement said portable electronic apparatuses with new, digital multi-media and telecommunication technologies such as for example: display interfaces with increasingly high quality and able to work in any condition of environmental visibility; increased ***calculating power that enables to actuate on mobile devices applications which once were only intended for personal computers***; wireless communication and data exchange systems, and others.

Ex-1034, 1:19-31. Tecchiolli’s description of the state of the art and, in particular, the growing demand for ever smaller but still powerful electronic devices, including watches and other wearable devices, is consistent with my recollection and would be well-known to persons of ordinary skill in the art at the time of the ’085 Patent.

69. Tecchiolli later describes some of the requirements that consumers had for such wearable devices, including that they have features such as: “wireless communication,” “exploit the multimedia services offered, for example video streaming,” have “evolved graphical interfaces,” have “a decidedly limited weight, so that it is not bulky and heavy or able to reduce the users freedom of movement with extended use, cause discomfort and tiredness of the limb,” and have “optimize[d] energy consumption.” Ex-1034, 1:33-3:11. Given the difficulty of achieving these goals in a wearable device with a limited battery, Tecchiolli (and many other inventors in the years before the '085 Patent) devised techniques for maximizing battery life in wearable and other portable electronic devices, as described below.

B. Battery life and power mode switching

70. I have used a wide range of mobile phones and other electronic devices since the 1990s. All these battery operated devices had features to conserve battery power. This is understandable because battery life was considered to be a “critical concern” when designing systems and applications for mobile devices. Ex. 1036, 1; Ex. 1037, 74, 88. “According to a user survey by Gartner in France, Germany, Italy, Spain, Sweden and United Kingdom, battery life, size, weight and price were the most important considerations for people buying mobile phones.” Ex. 1037, 74.

71. Every one of the mobile phones that I have used had some form of “sleep” or “standby” mode wherein the phone would continue to operate in a low-power mode with a display being off while being able to receive phone calls. In fact, since a major point of mobile phones is to make calls, while being mobile (and thus running on a battery), all mobile phones that I am aware of supported this form of operation. That is, they could operate in a low power mode, typically called sleep or standby with a display being off while continuing to be able to receive calls. To conserve battery power, these phones enter the sleep or standby mode after a preset time period of inactivity.

72. Such power saving functionality was not limited to phones but has been consistently applied to all types of battery-powered electronic devices. For example, as early as 1997 patents such as U.S. Patent No. 5,612,931 (“Sato,” Ex-1017) disclosed “a digital electronic wristwatch 1” with “an attitude switch...for detecting an inclination of the wristwatch 1 and performing a switching operation,” as shown in Figure 1 below. Ex-1017, 3:4-11.

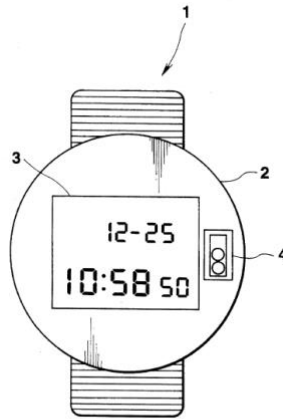


FIG.1

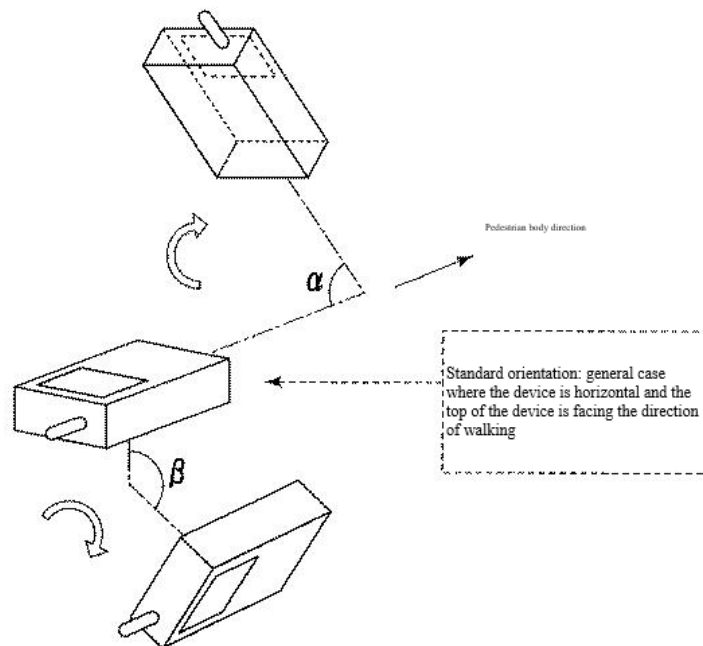
73. Sato explains that the “switching operation” relates to turning on or off the lighting device such that after a predetermined motion (or set of motions) has been detected “the CPU 15 executes illumination control processing ... thereby outputting a control signal to the driver 20 ... turn[ing] on the lighting device 21 to illuminate the LCD17.” Ex-1017, 5:40-46. Sato teaches that “the lighting device 21 can be lighted for a predetermined time period” when the attitude detection switch has detected the required movement “within the predetermined time period.” Ex-1017, 6:18-24. Sato explains that this technique is advantageous because “the lighting device 21 is prevented during walking from being turned on and off unintentionally, and can be lighted in a reliable manner,” resulting in avoiding “unintentional lighting of the lighting device ... thereby saving the power consumption of the wristwatch 1.” Ex-1017, 6:18-32.

74. Tecchiolli, described above, is another example of a wrist-worn portable electronic device that focused on power management considerations. Tecchiolli explains that “[o]ne purpose of the present invention is therefore to achieve an energy saving device for a portable electronic apparatus which allows to optimize the energy saving by deactivating, completely or at least partly, the apparatus in its condition of non-use.” Ex-1034, 4:7-11. In particular, Tecchiolli is directed at automatically determining when the device is in use or in a non-use state, by analyzing position or activity, and activating “only when it is taken to a position that coincides with the position of use” and is “de-activated, or at least partly switched off, when it is in other positions, different from the positions of use.” Ex-1034, 4:32-5:32.

75. As another example, Japanese Patent Application Publication No. JP2007-41143 (“Nishijima,” Ex-1014) is directed to a mobile device “equipped with an autonomous navigation device for a pedestrian” and includes an “acceleration detection means for detecting the degree of tilt of the displaying part of the device.” Ex-1014 ¶¶1, 10. Nishijima notes a problem with prior art pedestrian navigation devices in that the “map drawing processing is continued even if the device is held in an orientation where the device screen is not being viewed causing a problem of consuming power. Ex-1014 ¶8. Accordingly, Nishijima discloses determining when “the device is in a use state where the pedestrian using the device is not

viewing the drawing image” and accordingly, “[w]hen the tilt of the device is detected to be outside a prescribed angle for a prescribed amount of time,” switching to “low power consumption by halting display calculation processing for drawing data.” Ex-1014 ¶18. When the device “determines that the detected tilt of the device is within a prescribed angle range for a prescribed period of time” such that the user may be viewing the device, “the low power consumption mode is canceled, and the drawing data saved in retention memory is displayed immediately.” Ex-1014 ¶20. Figure 3 illustrates different orientations, which are used in determining the correct power mode.

FIG. 3



76. Similarly, U.S. Patent No. 7,873,849 (“Mucignat,” Ex-1019) discusses switching between various power modes including a “high active power mode,” a

“low active power mode,” a “sleep power mode,” and a “hibernate power mode” based, in part on motion detected by a motion sensor and various time duration requirements. See Ex-1019, 8:51-9:5, 12:15-13:40, 15:42-16:19, Figs. 3A-3D. Mucignat explains that “keeping certain device components active” when not needed, “may consume a significant amount of the power available to the device.” Ex-1019, 1:30-32. Accordingly, Mucignat discloses an electronic device operable “in various power management modes in order to conserve power during certain situations,” such as switching from an active power mode to a sleep power mode when certain device components have not been used and/or certain instructions have not been received within a certain period of time.” Ex-1019, 2:65-3:3; 8:51-9:5. Mucignat explains that certain components, such as a motion sensor may continue to be powered in a low-power mode while other “non-essential power intensive processes” may be disabled to improve battery life.” Ex-1019, 3:6-10, 8:59-9:5.

77. Other examples of power mode switching based on particular inputs and movement patterns are described in the sections that follow.

C. Detecting movement of electronic devices using accelerometers

78. By the time of the '085 Patent, persons of skill in the art recognized the value of allowing a user to provide input to an electronic device using various sensors such as motion sensors, gyroscopes, infrared detection, cameras, and other sensors. Researchers have been exploring tilt detection for user interfaces since the

1990s. For example, a 1998 paper described the use of a commercially available tilt sensor based on an electrolyte bordered on two sides by a pair of conductive plates. That sensor was mounted to the case of a Palm Pilot and used to implement a “Rolodex-like metaphor.” Ex-1038, 21. My own 2010 paper that I described above in my Qualifications section cited numerous papers describing the use of tilt and orientation. Ex-1035. In particular, it listed 4 papers that described tilt and orientation on a mobile device to navigate through lists and menus, and 5 more to disambiguate between characters when typing. *Id.* These papers used tilt to navigate through one dimensional lists and menus, invoked commands by rotating the device, used a “tilt-to-write” system to enable single handed text entry, and more. Accelerometers, mentioned in several of those papers, are well adapted for this type of input and information gathering.

79. Miniature silicon-based accelerometers have been known since at least 1979 as described by a technical paper published at that point. The accelerometer is very small (“weighing less than 0.02g, in a 2 x 3 x 0.6-mm package.”) and is made using a “batch-fabricatable” process using “silicon IC technology”. Ex-1039, Abstract, 1911. It works by having a “very thin silicon cantilevered beam surrounded by a 200-μm-thick rim. This rim provides a rigid support for one end of the beam, a region for contact pads, and mounting surfaces parallel to the plane of the beam.” *Id.*, 1911. There are “narrow fingers extending from [the] metal pads”

that contact resistors finally leading to an amplifier and recorder which provide the measurement of how much the beam moves due to acceleration along one axis. *Id.*, 1912. The result is sensitive to accelerations as low as one-hundredth of the acceleration of gravity at a bandwidth of 100 Hz with accuracy of around 1 percent. *Id.* 1911.

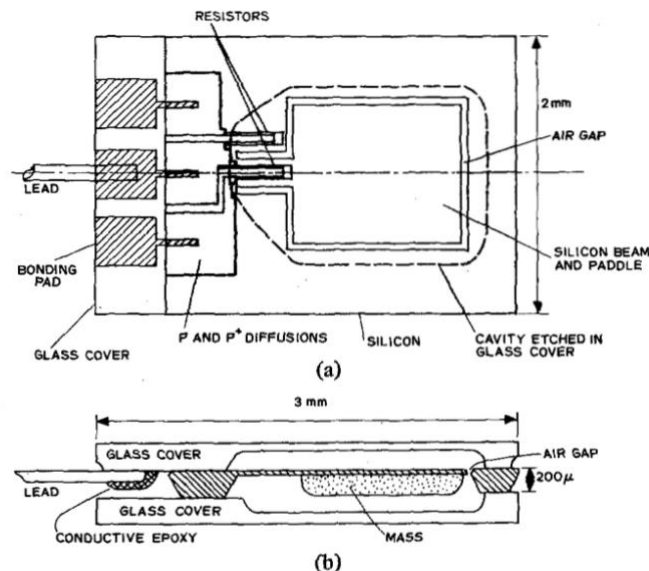


Fig. 1. Top and cross-section views of the accelerometer. (a) Top view.
(b) Centerline cross section.

80. A 2008 article by Thomas Schlömer et.al. presented at the Proceedings of the Second International Conference on Tangible and Embedded Interaction in February 2008 explains the rise in new interaction methods for sensor-based recognition using an accelerometer. Ex-1018, 11. Schlömer notes that “user interaction is moving away from mouse and pens and is becoming pervasive and much more physical and tangible” because “[n]ew emerging interaction technologies allow developing and experimenting with new interaction methods.”

Id. In particular Schlömer focuses on “the design and evaluation of...sensor-based gesture recognition” and uses the “Wiimote’s acceleration sensor...for gesture recognition.” *Id.* The paper notes that “more affordable hardware,” such as the Wiimote, shown below, had been developed to “detect motion and rotation in three dimensions through the use of accelerometer technology.” *Id.*



Figure 1. The Wii Controller (Wiimote).

81. In the case of the Wiimote specifically, the Analog Devices ADXL330 provides an integrated three axis acceleration sensor and Schlömer explains that by this time in 2008, “[a]ccelerometer-based gesture recognition has been discussed in many publications” and is also used in commercial work, for example by AiLive Inc. for training and recognizing arbitrary gestures. Ex-1018, 11, 13. Schlömer

discloses that the concept of gesture recognition using an acceleration sensor is that “gestures are represented by characteristic patterns of incoming signal data, i.e., vectors representing the current acceleration of the controller in all three dimensions.” Ex-1018, 1. Schlömer goes on to explain using these techniques to deal with a problem common to accelerometer-based gestures—determining when the user is making a gesture and what the gesture is. For example, Schlömer explains that their system applies an “idle state filter” where the magnitude of the acceleration is small. *Id.* A POSITA would have recognized that a similar process, including detecting idle states, could be used for training a wide variety of acceleration-based gestures in a wide variety of portable electronic devices, including watches containing accelerometers.

82. Patents from around the world filed well before the '085 Patent's priority date reflect these facts and describe the use of accelerometers in a variety of electronic devices. For example, Chinese Patent Application Publication No. CN 101458667 (“Zhenghao,” Ex-1016) is directed to “a power management method for a handheld electronic device that uses a gravity sensor (G-sensor) to detect a tilt state of the handheld electronic device to determine whether to enter a power saving mode and thus save power.” Ex-1016, ¶5. Zhenghao's gravity sensor, a type of accelerometer, “is used to detect a normal vector on a plane of the handheld electronic device” that “includes an x-component, a y-component and a z-

component.” Ex-1016, ¶¶6-7. In order to determine whether to enter the power-saving mode, Zhenghao teaches that the gravity sensor determines the device is facing downward based on the “z-component of the normal vector [being] negative and the x-component and y-component of the normal vector both fall[ing] within a specific range.” Ex-1016, ¶8. Figure 2 below illustrates the normal vector components when the electronic device is facing upward and downward.

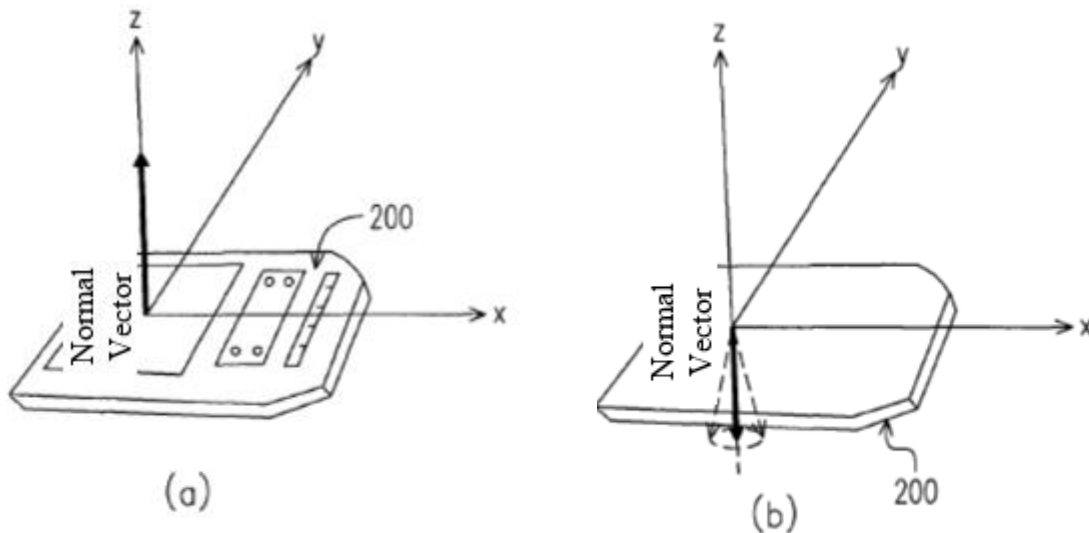


FIG. 2

83. As another example, Mucignat, described above, utilizes inputs from a motion sensor, such as a three-axis accelerometer, in order to determine whether to switch power modes. Ex-1019, 7:23-36. Mucignat explains that to “enhance a user’s experience interacting with electronic device 100, the electronic device may provide the user with an ability to generate useful information by moving the

electronic device,” such that a “motion sensor 112 may detect movement caused by a particular type of user motion event (e.g., a user shaking sensor 112 or a user walking with sensor 112).” Ex-1019, 7:14-21. After detecting movement with the accelerometer, Mucignat discloses that the device “analyze[s] this generated motion sensor data...for determining whether or not to perform a specific device operation based on the distinguished type of user motion (e.g., using rules or settings provided by an application run by processor 102).” Ex-1019, 7:30-36. Among other functions, the accelerometer data is used in Mucignat to allow the processor to determine whether the device, or certain components of the device, should be placed in lower power modes. Ex-1019, 12:15-13:40, 15:42-16:19.

84. Similarly, U.S. Patent No. 9,122,735 (“Locker,” Ex-1020) discloses transitioning an electronic device into an altered power state (e.g., “a state in which the electronic device 200 performs operations related to power savings”) based on “accelerometer output.” Ex-1020, 6:14-28. Locker discloses that the accelerometer “measures physical acceleration (magnitude and direction), position, and/or shock of the electronic device” and that its output can be used to “determine that the electronic device 200 is in use even if it is not receiving and/or has not received user input for a predetermined period of time.” Ex-1020, 5:41-43, 6:57-67.

85. Utilizing motion sensors and interpreting their output to change device functionality was not limited to phones or other, larger, electronic devices at the time

of the '085 Patent. Rather, as discussed above, these features were also miniaturized into the watch form factor. For example, Tecchiolli, described above, discloses a watch that is activated or deactivated based on whether it is positioned such as to be in use or not. Ex-1034, 4:28-5:32. Although Tecchiolli does not explicitly disclose an accelerometer, it does teach a “detection circuit 19 [that] comprises two sensors 30 and 31 which respectively detect the inclination of the arm with respect to a substantially vertical axis “z” and the rotation of the wrist of the user 12, substantially on two axes.” Ex-1034, 10:18-26. A POSITA would have understood that an accelerometer is an ideal motion sensor for this type of application.

86. As another example of detecting gestures and motion with a watch, a paper presented at the 15th Annual International Symposium on Wearable Computers describes “AirTouch,” a 2011 iteration of a wireless contact free gesture based wrist interface a group of researchers associated with HP Labs and Georgia Institute of Technology had been working on since at least 2007. *See* Ex-1022 3, 10. This paper describes “Air Touch” as consisting of two parts: “the sensors in a wristwatch UI and a tactile display.” Ex-1022, 4. Air touch used proximity sensors “to capture in-air hand gestures between 10-60 cm above the wrist” and required a “trigger gesture” to confirm that these gestures were intentionally input. Ex-1022, 4-5. Figure 5, below, illustrates the process in AirTouch for detecting user interactions:

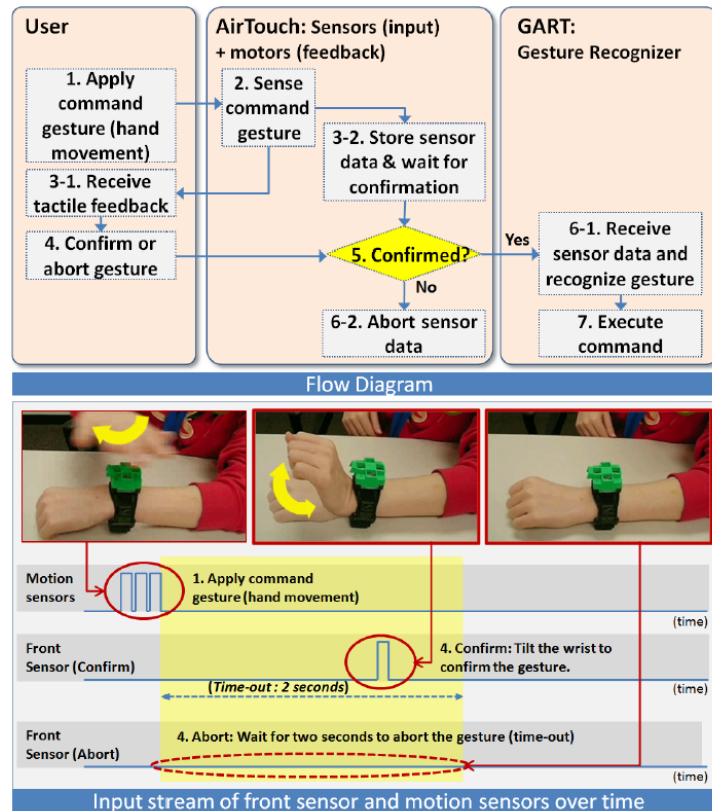


Figure 5. AirTouch interactions.

D. Techniques for defining and interpreting movement patterns

87. For input to control an action on an electronic device, the device must be able to determine when the input begins and when it ends. This is the nature of controlling actions since time is continuous and input events continue over time that are intended to control different things; we must know which subsequence of a sensor stream should be used for a particular controlling action. When using a device such as a mouse, it is relatively straightforward as a controlling input (often called a “gesture”) often begins with the press of a mouse button followed by movement of

the mouse while the mouse button is down and ending with the release of the button. But that oversimplifies the situation as “double-clicks” of the mouse button can provide an additional control – which means that the controller must consider the duration between mouse clicks. In this situation, if the duration is short, then two separate presses and releases of a mouse button can be interpreted as a single controlling gesture. This concept of tracking inputs and delineating the beginning and end of gestures was articulated in a 1990 paper by William Buxton where he provided a model and way to illustrate the model using state diagrams. Ex-1040. For example, Figure 1 models a simple 2-state transaction where he uses the term “tracking” to represent the movement of the mouse when no buttons are pressed and “dragging” to represent the movement of the mouse when a button is pressed. Ex-1040, 3. He explains “In State 1, moving the mouse causes the tracking symbol to move. *Id.* Depressing the mouse button over an icon permits it to be dragged when the mouse is moved. This is State 2. Releasing the mouse button returns to the tracking state, State 1.” *Id.*

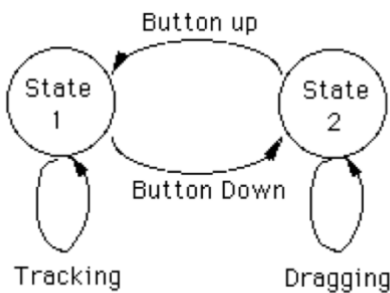


Figure 1. Simple 2-State Transaction

He further explains how these state diagrams can model time so that holding in a place for a specific duration can be part of the mode. For example, he models double clicks. *Id.*, 5. And he explains that “point and select is an integral component of most direction manipulation interfaces” and: “The selection signal can also be generated via a timeout cue. That is, if I point at something and remain in that position for some interval τ , then that object is deemed selected.” *Id.*, 7-8.

88. Joselli explains that “segmentation” is a general term for determining when a gesture begins and when it ends. Ex-1008, 144. For example, in a touch-based gesture, it is easy to identify the beginning and ending since the beginning “is when the user first touch[es] the screen” and the ending is when the “user release[s] the screen.” Ex-1008, 144. However, a POSITA would have understood, as Joselli explains, that “for accelerometer gestures the segmentation is more difficult.” Ex-1008, 144.

89. A variety of techniques have been employed to properly segment accelerometer-based gestures. For example, in some prior art systems, segmentation was done using a button-based system where the user was required to press a button in order to signal the beginning and ending of a gesture. See Ex-1008, 144 (citing Schlömer, 11-14). However, although the use of buttons avoids the need for computations for determining the beginning and ending of a gesture, pressing

buttons is not always possible in the context of accelerometer-based gestures. Ex-1008, 144.

90. Another option, employed by Joselli and a number of other contemporaneous devices, is a “no-button segmentation” in which an accelerometer gesture is segmented by creating a definition of the gesture based on “observation of the accelerated data and the movement of [a] user during the recognition of different gestures.” Ex-1008, 144. Joselli teaches that there are three parts to such a definition: the beginning, the middle, and the end: “Normally gestures begins with a fast acceleration, a continuous direction change during the gesture, and it ends with a stop of the movement. In this work, the authors have observed that normally, a good gesture needs a duration of more than 0.6 seconds and less than 2 seconds.” Ex-1008, 144.

91. As described below, other patents and publications similarly described detecting motion-based gestures by analyzing the position, timing, or both of the beginning, middle, and end of a gesture or movement pattern.

92. A 2000 paper describes a tilt-based method to “scroll, select, and command an application without resorting to buttons, touchscreens, spoken commands, or other input methods.” Ex-1041, 40. It explains that a mechanism is needed to control when the device scrolls and when it doesn’t, describing how “other systems that have investigated ‘tilt to scroll’ have provided a ‘clutch’ button to

engage scrolling.” *Id.* It describes that pressing a button to start a tilt based interaction “comes at a some cost.” “In some simple user tests that we conducted at the start of this investigation, users complained about having to tilt the device and press the button in a synchronized manner.” *Id.* This paper describes a way of avoiding the need to press a button to control whether the user is scrolling or not and that is to “**hold still to orient.**” “The final gesture used in the photo album is holding the device still for a couple of seconds ... the user first gestures to disable scrolling, then **holds the device still** in the new neutral orientation for a couple of seconds, and gestures to enable scrolling.” *Id.* 40-41 (emphases added). Thus a POSITA would have understood from this that holding a device still for a period of time can be a useful input as part of a gesture sequence.

93. Zhenghao, described above, similarly teaches that in order to prevent the device from inadvertently entering a power-saving mode, before the power saving mode is entered, “[w]hen the normal vector is determined to be facing downward, it is further determined whether a downward state of the normal vector is maintained for a first specific time” after which point “the handheld electronic device is controlled to enter the power saving mode.” Ex-1016, ¶41. Similarly, to switch to normal-operating mode, Zhenghao teaches that data from the gravity sensor is provided to an embedded controller, which “analyzes the data to determine whether the normal vector deviates from the downward direction.” Ex-1016, ¶42.

If it does, “the embedded controller further determines whether the normal vector deviates from the downward direction for a time more than a second specific time” and only then is the handheld electronic device returned “to the normal operation mode.” Ex-1016, ¶42.

94. As another example, Linjama discloses that an acceleration-based gesture is defined, in part, from the duration that that an electronic device spends in various orientations. See Ex-1012, ¶¶ 46-52. Thus, in Linjama the predefined gesture “may include turning mobile terminal 10 to face downwards **for a certain period of time**, i.e., one or two seconds, and then turning the mobile terminal 10 to face upwards. *Id.*, ¶48 (emphasis added). Linjama teaches that this time period is determined by taking two consecutive orientation readings spaced apart by a certain period of time and if the signals both indicate a downward orientation, the mobile terminal will determine that it is facing downward for that period of time and provide a control signal based on the predefined gesture. *Id.* Similarly, after the downward facing signal has been received, “the user may then turn the mobile terminal 10 so that the mobile terminal is facing upwards.” *Id.*, ¶51. “When this sequence of orientations corresponds to a predefined gesture, the gesture detector 16 provides a control signal representing this predefined gesture to the controller.” *Id.* In one embodiment described by Linjama this means that after the mobile terminal has faced down for one or two seconds, followed by facing upwards, “the control signal

may cause the display to be illuminated for a period of time.” *Id.* Furthermore, Linjama points out, as a POSITA would have known, that “any number, sequence and combination of gestures comprising various orientations” are within the scope of the Linjama disclosure. *Id.*

95. Similarly, U.S. Patent Application Publication US 2010/0013778 (“Liu,” Ex-1021) discloses a power-mode switching portable electronic device that switches power modes based on the user’s actions as detected by an accelerometer. Ex-1021, ¶¶6, 8-9, 12-13, 23, 26. Specifically, Liu discloses that in “both of the operating mode and the sleep mode, the MCU 16 will monitor...the accelerometer 15” and that the accelerometer detects “the movement of the portable electronic device 10 in the three dimensional space to determine whether the portable electronic device is ‘being lifted’ or ‘being put down.’” *Id.*, ¶¶28, 30. The portable electronic device is only switched between power modes when the accelerometer senses that the device satisfies a predetermined condition or range. *Id.* ¶30. In Liu, the predetermined condition includes that when the accelerometer monitors movement data “the application processor 14 or the MCU 16 will start a timer and, within a predetermined period of time, that the portable electronic device 10 is being lifted based on the value of g outputted by the accelerometer 15, to switch the system to operating mode...once such predetermined period of time has elapsed.” *Id.* ¶ 36.

96. U.S. Patent Application Publication No. 2009/0265671 (“Sachs,” Ex-1033) provides yet another example of utilizing time duration information in interpreting motion-based gestures. Sachs, like many of the other references discussed herein, includes “motion sensors that can measure motion of the device (or portion thereof) in space” such as by measuring “one or more axes of rotation and one or more axes of acceleration of the device.” Ex-1033, ¶41. Sachs discloses that “at least some of the motion sensors are inertial sensors, such as gyroscopes and/or accelerometers.” *Id.* In Sachs “[a] ‘gesture’ or ‘motion gesture’...is a predefined motion or set of motions of the device which, when recognized by the device have occurred, triggers one or more associated functions of the device.” Ex-1033, ¶50. These motion gestures may include a “set of motions such as a shake or circle motion, or can be a simple movement of the device, such as tilting the device in a particular axes or angle.” *Id.* In a section titled “Other Techniques for Improved Gesture Recognition,” Sachs explains that “timing of features in motion data can be used to improve gesture recognition” and that “[s]ome gestures may require particular features (i.e., characteristics) of the sensor data to occur ***in a particular sequence and with a particular timing.***” *Id.*, ¶78 (emphasis added). Sachs provides an example where three features must occur in sequence with a particular time duration (e.g., 100 ms) of one another and discloses both hard coding such time intervals or using a relative timing to allow for variability between users. *Id.*, ¶¶78-

79. In order to facilitate the timing of various features, Sachs provides a number of “feature detectors” (374 in the Figure 17 below), each of which provides timer values (376) “which indicate[] the time values appropriate to the data feature detected.” *Id.*, ¶126. These time values are then “provided to higher-level gesture detectors 380” which “each use the timing and magnitude values 378 and 376 from all the feature detectors 374 to detect whether the particular gesture associated with that detector has occurred.” *Id.*, ¶127.

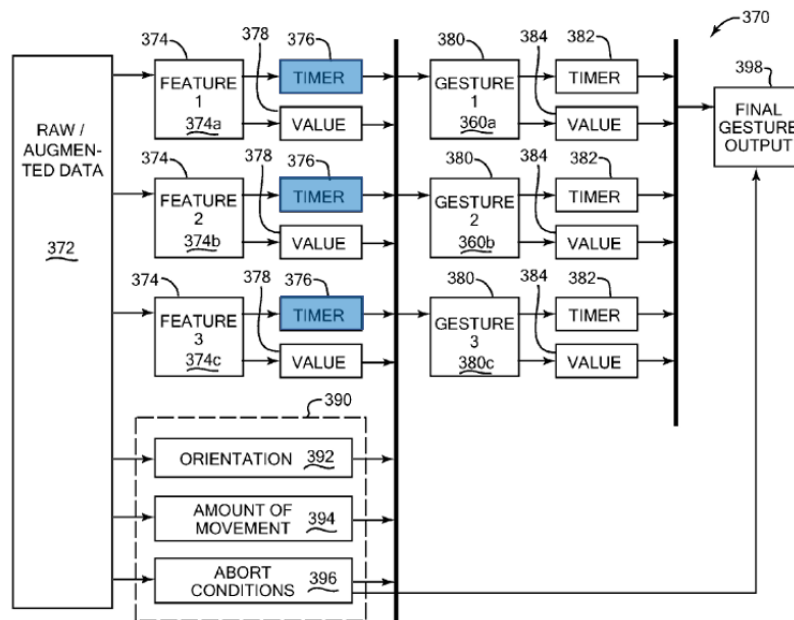


FIG. 17

97. Furthermore, “hold” user interfaces have been widely available in commercially interfaces for decades, including on mobile devices. For example, US Patent 5,754,176 (Ex-1052) described both Microsoft Windows systems “tooltips”

and Apple Macintosh operating system's "balloon help". "For example, a small button with an obscure graphic might have associated therewith a tooltip comprising a small text box that provides a short description of the button, such as the menu name for the particular function, which is displayed when the mouse pointer is placed over the button for a predetermined period of time." Ex-1052, 2:28-37. Another example is that Microsoft's Pocket PC platform supporting touch screen mobile devices including PDAs included a "tap-and-hold" feature. When a user touched the screen and held the finger or stylus down on that spot for a period of time, a menu would appear showing available items for the element that was touched. "**Tap-and-hold.** Tap and hold the stylus on an item to see a list of actions available for that item. On the pop-up menu that appears, tap the action you want to perform." Ex-1053, 8.

98. Thus, by the time the '085 Patent was filed, a POSITA would have been familiar with the concept of detecting movement patterns (including durations and holding the device still) of an electronic device, including a wristwatch, interpreting those movement patterns, and effectuating a function or mode change on the basis of that movement pattern. The specific art I discuss below demonstrates that all of the '085 Patent's claims were obvious.

VI. THE PRIOR ART IN THE APPLIED INVALIDITY GROUNDS

A. Yeung (U.S. Patent Publication No. 2009/0164219) (Ex-1005)

99. Yeung, titled “Accelerometer-Based Control of Wearable Devices,” was published on June 25, 2009. Ex-1005, Cover.

100. I understand Yeung is prior art under at least 35 U.S.C. § 102(b).

Yeung discloses using “accelerometer-based orientation and/or movement sensing to control wearable devices, such as wrist-worn audio recorders and wristwatches.” Ex-1005 ¶5.

101. In Figure 1, Yeung depicts a “wrist-worn audio recorder 30 incorporating a three-axis accelerometer 32” that “senses acceleration in three orthogonal axes X, Y, and Z.” Ex-1005 ¶37. While Yeung refers to this device as an “audio recorder,” it is an electronic wristwatch with additional features, as shown in Figure 1: “The wrist-worn audio recorder may usually also contain a real-time clock, so that the recorder can provide additional time-keeping function.” Ex-1005 ¶37. This time of day can be shown on display 34. *Id.* ¶37. Throughout this declaration, I have referred to this device described by Yeung as a “watch/recorder.”

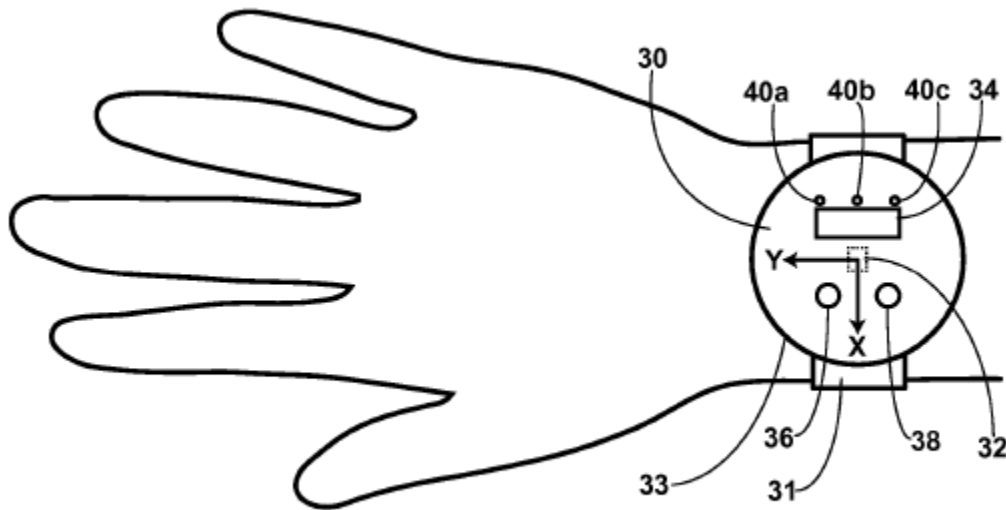


FIG. 1

102. In connection with Figure 6, Yeung explains that the “audio recording function of audio recorder 30 turns on automatically when the user positions audio recorder 30 in a predetermined orientation...and/or after audio recorder 30 has completed a predetermined movement.” Ex-1005 ¶48. For example, as shown in Figure 6, the predetermined orientation may be such that the “angle between the X-axis and the direction of the gravitational acceleration G is about 45 degrees” and the “angle between the Z-axis and the gravitational acceleration G is about 135 [degrees].” Ex-1005 ¶47.

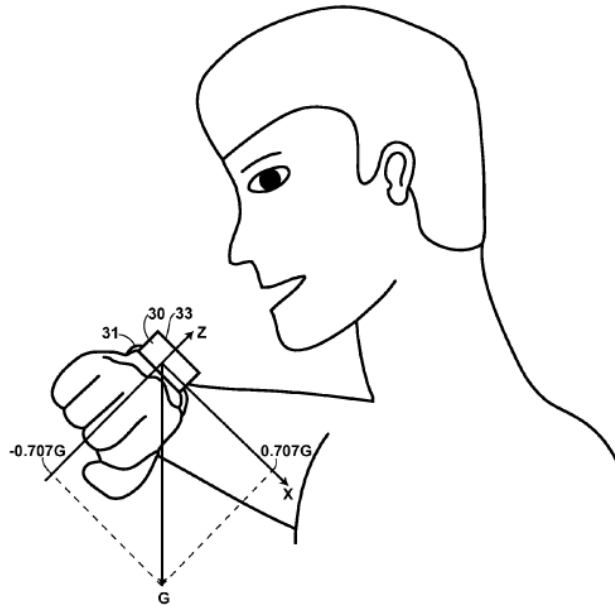


FIG. 6

103. In addition, “for more robust detection, recorder controller 48 can ... detect a predetermined movement, such as the natural movement of lifting the arm upwards from a resting position (i.e., from the side of the body or from in front of the lower end of the torso) and tilting the watch/recorder towards the mouth to activate audio recording.” Ex-1005 ¶47. Further, the “recorder controller 48 can be designed to activate an audio-recorder function ... only after audio recorder remains in a static position for a predetermined period of time after a predetermined wrist and arm movement pattern has been detected.” *Id.* ¶52.

B. Ruiz (U.S. Patent No. 8,228,292) (Ex-1006)

104. Ruiz, titled “Flipping for Motion-Based Input,” was filed September 30, 2011, is a continuation of U.S. Patent Application No. 12/770,325, filed April

29, 2010, and claims priority to Provisional Application 61/320,663, filed April 2, 2010. Ex-1006, Cover.

105. I understand Ruiz is prior art under at least 35 U.S.C. § 102(e).

106. Ruiz describes “systems and techniques for interpreting motion-based user inputs to a mobile computing device.” Ex-1006, 1:15-18. Ruiz focuses on a specific gesture, which it refers to a “double flip delimiter,” for changing modes. Ex-1006, 16:27-17:18. Described in more detail below, the double-flip delimiter is essentially flipping the device over and then flipping it back to signal that the user wants to use the device as a motion-detecting device. Ex-1006, 16:62-65.

107. For example, Ruiz discloses using a “particular motion-based input ... as a delimiter to indicate that a user would like to ‘open’ the device to additional motion-based inputs.” Ex-1006, 4:26-31. For example, “[t]he effect of this motion-based input may be to change an operating mode of the device.” Ruiz explains that the “motion-based delimiting input may either precede or follow other motion-based inputs that the delimiter is aimed to identify for a device.” Ruiz further explains:

Where the delimiter follows the other inputs, motion-based data may be cached across a trailing window of time on a device, and if a delimiter input is received within a predetermined time period of such input (e.g., 200 ms), the data in the cache may be processed to determine what additional motion-based input the user of the device would like to perform.

Ex-1006, 8:61-67. In other words, even before the device was in a motion-detection mode, a user could make a motion gesture (such a moving the device in a circle) and then complete the double-flip delimiter within 200 ms, and the device would then look back through the data cache to fetch that prior motion (e.g., movement in a circle), and interpret that as a motion command.

108. As mentioned above, Ruiz focuses on a particular delimiter, which it refers to a “the double flip delimiter.” Ex-1006, 16:27-17:18. Ruiz explains that “the double flip delimiter is performed by quickly rotating the wrist such that the phone’s display is facing away from the user, then back to the original position with the display facing the user.” Ex-1006, 16:62-65. Examples of the double flip delimiter are shown in Figures 1a and 1b, below. See, e.g., Ex-1006, 4:42-6:42. Note that the two figures illustrate an identical motion but in Figure 1A there is a reference surface beneath the mobile device while in Figure 1B there is not. *Id.*



FIG. 1A

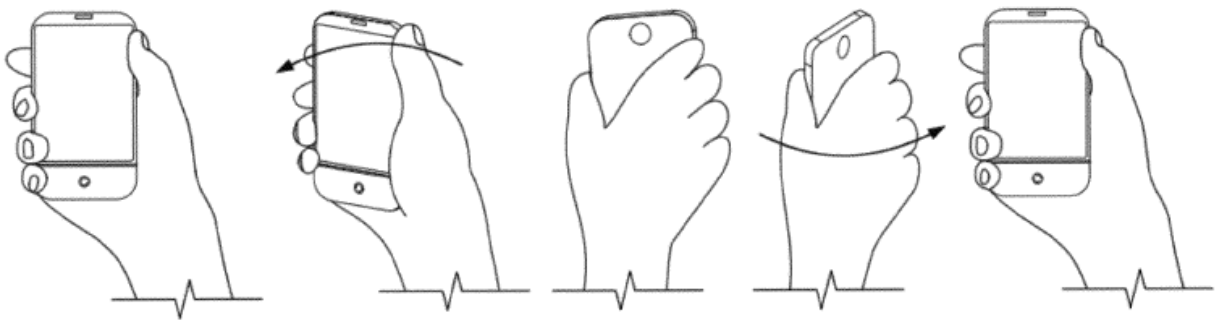


FIG. 1B

109. Ruiz discloses that the “main goal of having a delimiter is to limit false positives.” Thus, although other delimiter gestures may also be used, the double flip delimiter is advantageous because it is “a gesture that is unlikely to occur during normal use of the phone.” Ex-1006, 16:46-50; *see also id.*, 16:32-34. In addition, Ruiz teaches that the double flip delimiter is advantageous because it is “is not

dependent on hardware but instead relies on the sensors commonly available” in electronic devices, such as accelerometers, is “unique so that it does not collide with a gesture that makes more sense in another context,” and results in the screen being “visible after completing the gesture,” to allow the user to interact with the device once the gesture has been completed. Ex-1006, 16:41-58; *see also id.*, 1:28-29, 7:60-65.

110. I have also reviewed the provisional application to which Ruiz claims priority (Ex-1013) and note that in my opinion, at least Ruiz’s Claim 1 is supported by the disclosure in the provisional application. I have prepared the table below to illustrate how the provisional application supports Ruiz Claim 1:

Ruiz Claim 1 (Ex-1006)	Exemplary Provisional Citations (Ex-1013)
A computer-implemented method for identifying motion-based inputs to an electronic device, the method comprising:	¶1 (“This document relates to systems and techniques for interpreting motion-based user inputs to a mobile computing device.”)
placing the electronic device into an operating mode in which one or more functions are disabled;	¶17 (“[A] particular motion-based input may be assigned as a delimiter to indicate that a user would like to...switch input modes on the device so that the other motion-based inputs that were previously disabled will be enabled.”).

determining that the electronic device has been rotated in a first direction of rotation past a first threshold orientation;	¶7 (“The process comprises determining that the electronic device has been rotated...in a first direction of rotation past a first threshold orientation...”).
after determining that the electronic device has been rotated in the first direction of rotation past the first threshold, maintaining the electronic device in the operating mode in which one or more functions are disabled;	¶7 (“The process comprises determining that the electronic device has been rotated...in a first direction of rotation past a first threshold orientation; determining that the electronic device has been rotated in a second direction of rotation that is substantially the opposite of the first direction of rotation, past a second threshold, and switching a mode of the electronic device based on the two determinations. ”). I note that a POSITA reading the disclosure in paragraph 7 would understand that two determinations are required—one after the first rotation and a second after the second rotation in the opposite direction. Thus, a POSITA would have understood that the first rotation alone is not sufficient to trigger a switch in the operating mode. Thus, the electronic device is maintained in the original operating mode after determining the first rotation.
determining that the electronic device has been rotated in a second direction of rotation that is substantially the opposite of the first direction of rotation, past a second threshold; and	¶7 (“The process comprises...determining that the electronic device has been rotated in a second direction of rotation that is substantially the opposite of the first direction of rotation...”).

after determining that (i) the electronic device has been rotated in the first direction of rotation past the first threshold, and (ii) the electronic device has been rotated in the second direction of rotation that is substantially the opposite of the first direction of rotation, past the second threshold, placing the electronic device into an operating mode in which the one or more functions are enabled.	¶7 (“The process comprises determining that the electronic device has been rotated...in a first direction of rotation past a first threshold orientation; determining that the electronic device has been rotated in a second direction of rotation that is substantially the opposite of the first direction of rotation, past a second threshold, and switching a mode of the electronic device based on the two determinations.”).
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C. Alameh (U.S. Patent Publication No. 2011/0148752) (Ex-1007)

111. Alameh, titled “Mobile Device with user Interaction Capability and Method of Operating Same,” was filed on December 18, 2009 and published on June 23, 2011.

112. I understand Alameh is prior art under at least 35 U.S.C. §102(a) and (e).

113. Alameh describes sensing orientation states of a mobile device with an accelerometer and associating those movement patterns with particular commands.

Ex-1007 ¶17. In particular, Alameh discloses:

The accelerometer 104 can be used to measure static acceleration, such as the tilt of the mobile device relative to gravity, as well as dynamic acceleration, such as that resulting from motion, shock, or vibration of the mobile device. This information can be used to provide acceleration, motion, and orientation information for the mobile device. In addition, in conjunction with other information (e.g., information regarding an initial orientation and/or velocity of the mobile device), it

can be used to further determine a change in the orientation and/or velocity of the mobile device 102.

Ex-1007 ¶28.

114. To detect a command, Alameh requires a specific motion sequence. First, the device must be “placed in a substantially motionless orientation for a preset amount of time,” which “serves as a cue to the mobile device that the mobile device is potentially about to be moved in a manner that signifies that a command selection is forthcoming.” Ex-1007, ¶¶31-32. If motion is detected after this period of motionlessness, “the processor 204 uses the accelerometer 104 to track the motion of the mobile device 102 during movement.” Ex-1007, ¶32. The “motion is tracked until the mobile device becomes relatively stationary” at which point the “processor 204 compares the tracked movement to a list of numerous predefined/pre-stored motions” and “marks the particular command” identified as corresponding to the tracked movement. Ex-1007, ¶¶32-33. Figure 6 below illustrates this sequence of steps for identifying and executing a command based on the movement sensed by the accelerometer.

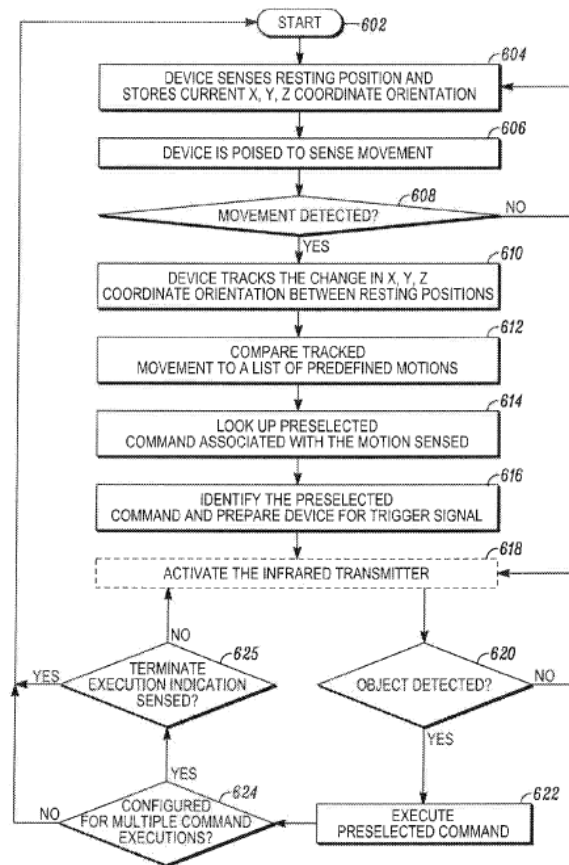


FIG. 6

Ex-1007, Fig. 6.

D. Joselli (M. Joselli and E. Clua, “gRmobile: A Framework for Touch and Accelerometer Gesture Recognition for Mobile Games,” 2009 VIII Brazilian Symposium on Games and Digital Entertainment, Rio de Janeiro, Brazil, 2009, pp. 141-150) (Ex-1008)

115. Joselli, titled gRmobile: A Framework for Touch and Accelerometer Gesture Recognition for Mobile Games,” was presented at a symposium held on October 8-10, 2009. Ex-1046, Ex-1047. It published on IEEE Xplore on June 7, 2010. *Id.*

116. I understand Joselli is prior art under at least 35 U.S.C. § 102(b) as of either its presentation date or its later IEEE Xplore publication date. In my opinion, Joselli would have been readily available to a POSITA before the October 2011 filing date of the '911 Application to which the '085 Patent claims priority and similarly would have been available by the filing of the parent application to the '085 Patent filed in 2012. For example, a POSITA would have been familiar with the IEEE Xplore platform in 2011 and understood how to use that platform to search for relevant papers. To the extent Joselli was published on IEEE Xplore on June 7, 2010, as indicated by Ex-1046 and Ex-1047, it would have been readily accessible to a POSITA as of at least that date. Further, I have reviewed other articles, also published by IEEE before the filing date of the '911 Application that cite to Joselli which indicates to me that not only could a POSITA have located Joselli but that Joselli was actually accessed and relied on by other researchers in this field before the filing date of the '911 Application. *See* Ex-1048, Ex-1049. That Joselli was additionally located as part of an international patent search in September of 2011 provides further evidence of its widespread availability. *See* Ex-1050, 32, 34.

117. Joselli discloses that after the use of accelerometers for detecting movement was popularized by the Nintendo Wiimote, many phone manufacturers began equipping their phones with accelerometers. Ex-1008, 142. Joselli explains that the iPhone was one of the first widely available devices equipped with both a

touch screen and an accelerometer but other products such as the Blackberry Storm, Nokia 5800, LG Arena, and others soon followed suit. *Id.* However, these devices “basically use[d] touch for user interactions.” *Id.* Joselli aimed to provide “a framework for gesture recognition through touch input or motion input that can be used for games or programs.” *Id.*

118. Joselli explains that “[g]esture recognition with touch/accelerated devices...is made by comparing the input pattern with the database pattern, [and] checking if they match.” *Id.*, 143. However, to “extract the pattern from the input data stream” and to compare that pattern “with the database pattern,” Joselli explains that the “data must be prepared and analyzed.” *Id.* This preparation and analysis of the data requires (i) segmentation to “determine when the gesture begins and when it ends,” (ii) filtering to “eliminate some parts of the data stream that do not contribute to the gesture,” (iii) quantization to approximate the stream of input data into a smaller set of values, (iv) modeling to compute the “likelihood of analyzed gestures” and (v) classification to identify the input gesture according to the database. *Id.*, 144. Figure 1, below illustrates how this framework is employed for both touch-based and motion-based input:

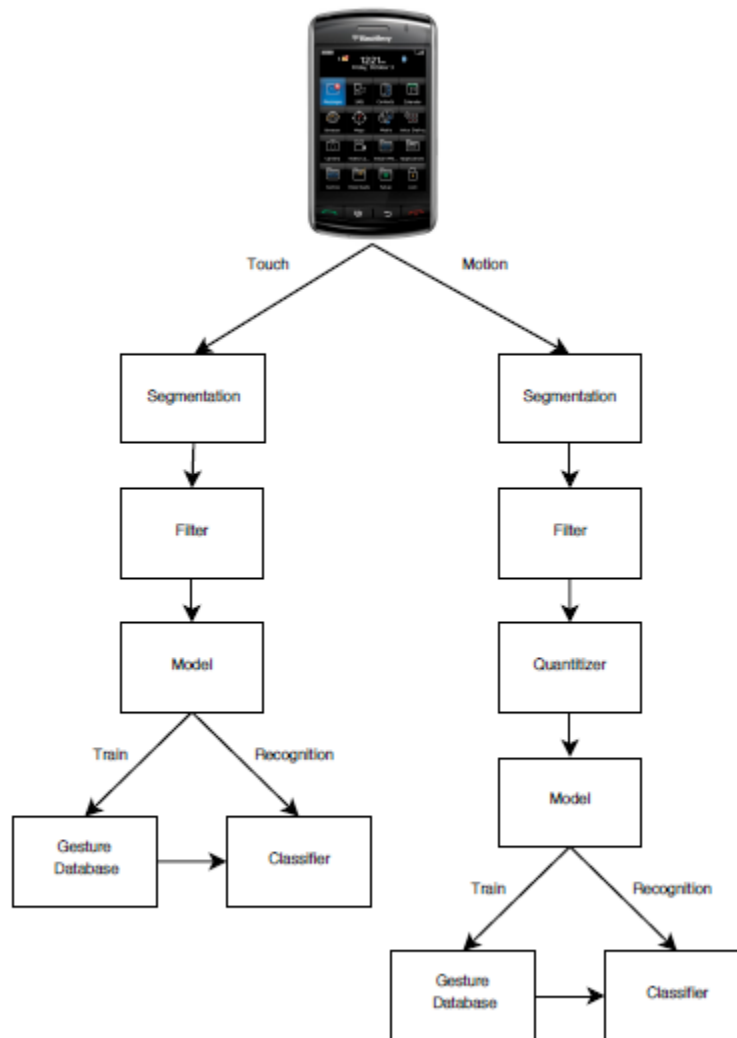


Fig. 1. System block diagram with major components of the framework.

Ex-1008, 145.

119. Of these steps, “segmentation” is the most relevant to my opinions in this declaration because it is used to automatically determine “the begin[ning] and end[ing] of a gesture.” *Id.*, 144. Joselli explains that “[i]n order to correct[ly] segment an accelerometer gesture, a definition of this kind of gesture is needed.” *Id.* Joselli explains that the authors built gesture definitions through observing the

acceleration and positional data of users performing a variety of defined gestures. *Id.* Joselli notes: “Normally a gesture[] begins with a fast acceleration, a continuous direction change during the gesture, and it ends with a stop of the movement.” *Id.* Moreover Joselli observes that “a good gesture needs a duration of more than 0.6 seconds and less than 2 seconds.” *Id.*

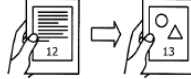
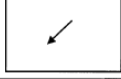
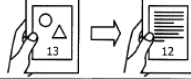
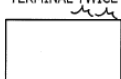
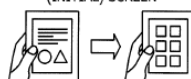
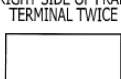
E. Yano (U.S. Patent No. 8,615,375) (Ex-1009)

120. Yano, titled “Motion Determination Apparatus and Motion Determination Method,” was filed on February 11, 2011 and issued on December 24, 2013.

121. I understand Yano is prior art under at least 35 U.S.C. §102(e).

122. Yano discloses a device to detect motion that includes “a detection information acquisition unit for acquiring, at regular intervals, detection information indicating a change in a position in ... a device including the motion sensor.” Ex-1009, 1:55-59. The motion sensor may be a “three-axis acceleration sensor” that detects the motion of a mobile device by measuring acceleration in each direction. *Id.*, 3:56-62. Yano takes the average acceleration over a certain period of time, such as 50 milliseconds, before moving to a subsequent step in its motion determination process. *Id.*, 6:4-30. Yano’s motion detection may be used to change modes or activate features of the electronic device, as shown in Figure 33, below.

FIG. 33

MOTION	INSTRUCTION (OPERATION)
FORWARD TILT TERMINAL 	SCROLL DOWN SCREEN 
BACKWARD TILT TERMINAL 	SCROLL UP SCREEN 
RIGHT TILT TERMINAL 	TURN TO NEXT PAGE 
LEFT TILT TERMINAL 	TURN TO PREVIOUS PAGE 
TAP TOP SIDE OF FRAME OF TERMINAL TWICE 	RETURN BACK TO LAUNCHER (INITIAL) SCREEN 
TAP RIGHT SIDE OF FRAME OF TERMINAL TWICE 	DISPLAY SUBMENU 

Ex-1009, Figure 33.

VII. CLAIM CONSTRUCTION

123. I do not believe that any claim term requires explicit construction to resolve the issues presented in this Petition. I apply the plain and ordinary meaning to each claim term, as that plain and ordinary meaning would have been understood by a POSITA.

124. I reserve the right to offer opinions on any claim constructions proposed in this proceeding or to offer opinions on additional constructions in the district court.

VIII. DETAILED EXPLANATION OF THE UNPATENTABILITY GROUNDS

A. Ground 1: Claims 1-10 Are Obvious over Yeung in View of Ruiz.

1. A POSITA would have been motivated to combine Yeung's teachings with Ruiz's teachings and would have had a reasonable expectation of success

125. A POSITA would have been motivated to combine Ruiz with Yeung's teachings and would have had a reasonable expectation of success in doing so because both relate to identifying and interpreting motion-based gestures in electronic devices using sensors such as an accelerometer. Yeung and Ruiz provide compatible solutions for detecting when a user is likely to be interacting with a portable electronic device and activating or deactivating certain features based on that determination. *Compare* Ex-1005 ¶¶15, 46-48 with Ex-1006, Abstract, 2:37-63, 4:53-5:6, 5:57-65. For example, Yeung provides various embodiments for detecting when a watch/recorder has gone through a particular movement sequence and arrived at a final predetermined orientation where it remains for a period of time and only activating the voice recorder after those criteria have been met. Ex-1005 ¶¶46-48, 52. For example, in Figure 6 Yeung discloses a particular orientation in which the user is likely to desire that the wrist-worn audio recorder is powered on:

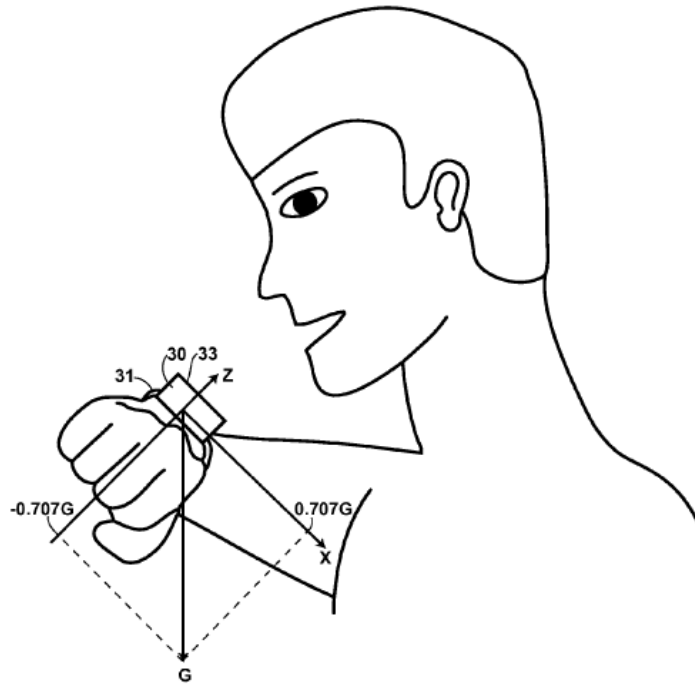


FIG. 6

126. Yeung acknowledges that one potential problem with such a device is activating the recording function accidentally, which may result in unwanted recordings or unneeded mode switches. See Ex-1005 ¶¶48, 52. As I discussed in the technology background section, a POSITA would understand that this is particularly problematic from a power management perspective since a mobile device like Yeung, particularly at the time of the '085 Patent, would not have a large battery and activating a voice recorder would, at a minimum, require utilizing additional circuitry for sampling the recorder, additional signal processing, and activating other power-hungry features such as a display (in order to control the voice recorder), resulting in premature battery depletion. See *supra* §V.B. For

example, Tecchiolli recognizes this well-known problem and implements power management techniques to address it in its wrist-worn electronic device. *See* Ex-1034 at 1:19-7:33.

127. Yeung similarly addresses this problem in some embodiments by first detecting a “predetermined movement” before activating the recording function. *Id.* ¶47. Yeung also discloses activating the recorder function (i.e., entering the higher power mode⁴) “only after audio recorder 30 remains in a static position for a predetermined period of time after a predetermined wrist and arm movement pattern has been detected.” *Id.* ¶52.

128. Ruiz similarly recognizes the importance of minimizing false positives or accidental gesture recognition. For example, Ruiz teaches that “a user may not want to have their device be open to receiving motion-based input at all times (lest they accidentally provide input that they did not intend.)” Ex-1006, 2:22-25. Again, a POSITA would have understood that one reason to limit the times when motion-based input is received is to minimize the use of processing power that could drain the battery. Another issue is having the device perform functions that the user did not intend and that may be disruptive to the user’s use of the device if accidentally

⁴ I describe in greater detail why activating the recorder function would be a higher power mode with respect to elements 1[pre] and 1[b], below. *See infra* §§VIII.A.2.a and VIII.A.2.c.

triggered. To address this issue, Ruiz proposes using a particular predefined movement called a “delimiter” “that is natural but is not likely to occur by accident ... so that a user can easily switch to an input mechanism that may be more convenient for them at the moment.” Ex-1006, 2:25-29. Ruiz describes this predefined movement as follows:

[D]etermining that the electronic device has been rotated in a first direction of rotation past a first threshold orientation; determining that the electronic device has been rotated in a second direction of rotation that is substantially the opposite of the first direction of rotation, past a second threshold; and analyzing motion of the device to identify motion-based inputs to the device other than the rotation of the device in the first and second directions, based on the two determinations.

Ex-1006, 2:39-47. Ruiz calls this particular delimiting input a “double flip, whereby a user makes a first motion with the device, and then backtracks through the motion.”

Ex-1006, 4:31-34. Figures 1A and 1B illustrate this double flip gesture in the context of a phone. *See, e.g.*, Ex-1006, 4:42-5:4, 6:3-45.



FIG. 1A

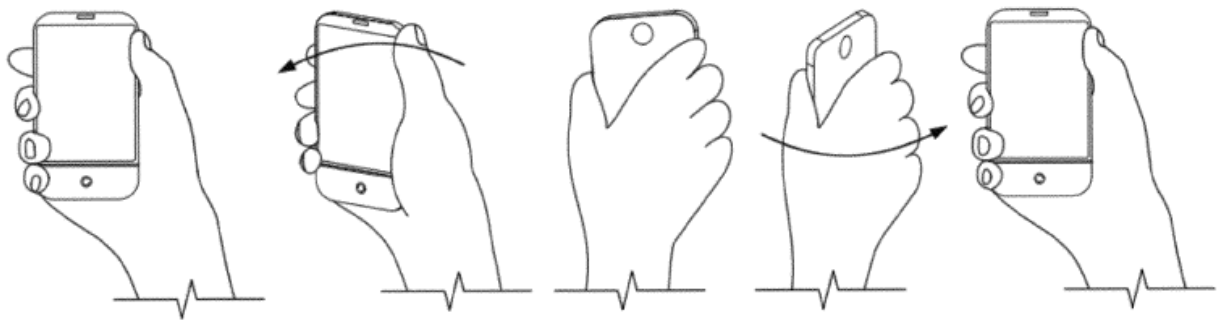
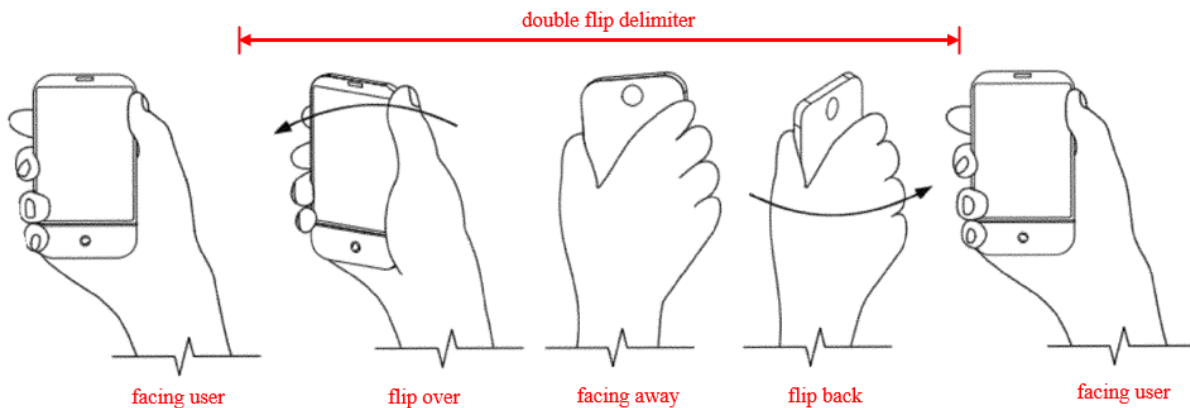


FIG. 1B

Ex-1006, Figs. 1A, 1B. I note that Figures 1A and 1B are described as illustrating the same “double flip” motion, the only difference being the presence of a fixed reference point (a surface behind the device) in Figure 1A. See Ex-1006, 4:42-6:45. Thus, although I have cited to portions of Ruiz referring to both Figures 1A and 1B as describing the “double flip,” I have primarily illustrated this motion with Figure

1B, which shows the intermediate “flipping” steps of the “double flip” motion, which I have annotated below, which shows “the double flip delimiter is performed by quickly rotating the wrist such that the phone’s display is facing away from the user, then back to the original position with the display facing the user.” Ex-1006, 16:62-66.



Ruiz Figure 1B

129. A POSITA would have understood that a delimiter could be any motion “that is natural but is not likely to occur by accident” and that the technique taught by Ruiz could be generalized to different electronic devices and different usage contexts by using different delimiter inputs. Ex-1006, 2:25-29. Indeed, a number of the references discussed in the technological background section above discuss the use of trigger gestures that accomplish a similar goal. *See, e.g.*, Ex-1022, 4-5; Ex-1033, ¶50. Indeed, Ruiz generalizes its preferred delimiter by indicating that it requires “the electronic device is in a position so that a graphical display of the electronic device faces a user of the electronic device both before the device is

rotated in the first direction and after the device is rotated in the second direction” and later sets forth criteria of a good delimiter. *See, e.g.*, Ex-1006, 3:13-17; 16:27-61.

130. A POSITA would have been motivated to minimize false positives so as to avoid unwanted recordings and unnecessary power consumption and would have known of and consulted both of these proposed solutions. As described in the Technology Background, above, both defining and interpreting gestures so as to avoid false positives was well known in the art, and a POSITA would have been familiar with multiple methods of segmenting detected movement in order to accurately recognize patterns of movement while minimizing false positives. *See supra* §§V.C-D. Moreover, Yeung itself indicates a desire to avoid false positives and would have recognized Ruiz’s delimiting double flip input as a convenient and effective way to accomplish this goal.

131. In particular, Ruiz provides an example of requiring a minimum time in an orientation range indicating a user is about to or recently has performed a movement pattern that should be interpreted by the device such that “[t]he effect of this motion-based input may be to change an operating mode of the device.” Ex-1006 4:62-5:20, 8:54-67. For instance, Ruiz teaches that at the bottom of the “double flip,” “[t]he user may hold the device in this orientation for a time period, which may be as little as a split instant.” Ex-1006, 4:62-62. Similarly, Ruiz notes that “where

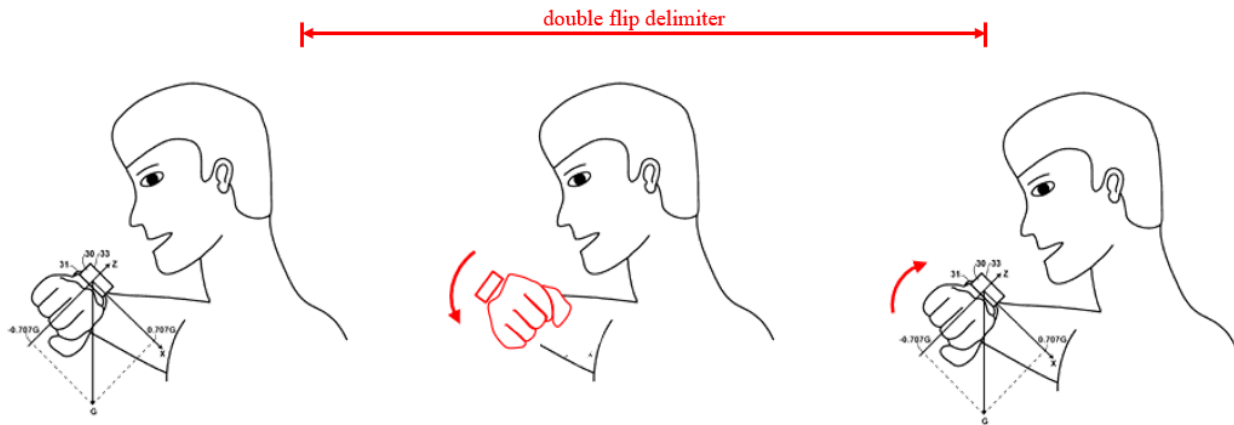
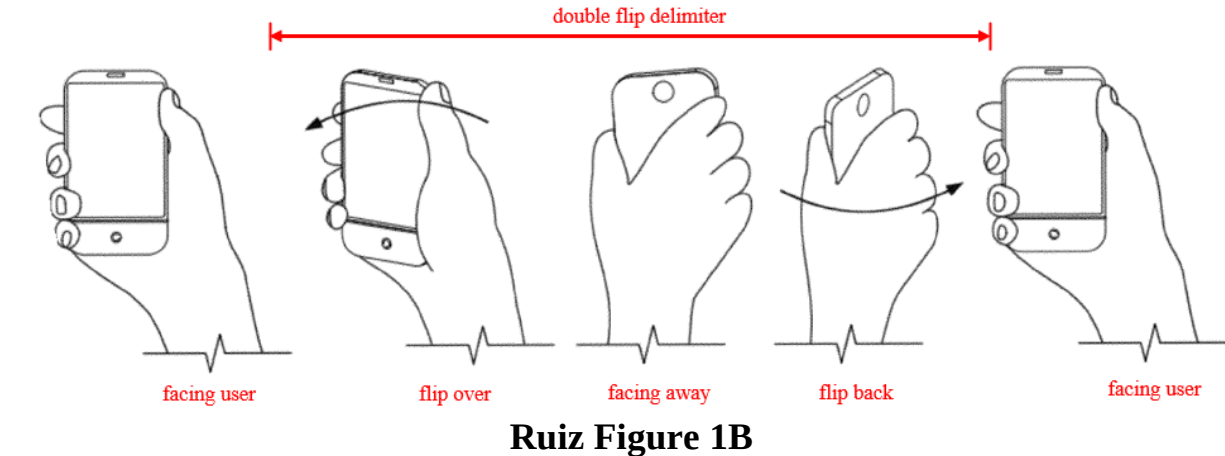
the delimiter follows the other inputs, motion-based data may be cached across a trailing window of time on a device, and if a delimiter input is received within a predetermined time period of such input (e.g., 200 ms), the data in the cache may be processed to determine what additional motion-based input the user of the device would like to perform.” Ex-1006, 8:61-67.

132. As I explained in the technology background, requiring that the device remain within certain orientation ranges for predetermined periods of time before making mode changes helps to reduce excessive mode switching, as described above. *See supra* §§V.C-D. For example, Joselli, Sachs, Zhenghao, and others all have certain time components corresponding to a predetermined movement pattern. *Id.* In addition to preventing the accidental recordings discussed by Yeung, a POSITA would have been motivated to make this change in order to conserve power that would otherwise be wasted due to excessive mode changes. As explained in my “Technology Background,” battery life would have been a critical consideration to a POSITA and identifying ways to avoid unnecessary transitions out of low power mode would have been recognized by a POSITA as very beneficial. *See supra* §V.B

133. It would have been obvious to a POSITA to apply these teachings of Ruiz to Yeung’s method of activating the voice recorder to reduce the likelihood of inadvertent mode switches. For example, Ruiz’s double flip delimiter input indicating that a user has performed an intentional predefined movement pattern

could be applied to the Yeung's activation that occurs only when the device "is in a predetermined orientation and/or ***after it has completed a predetermined movement.***" Ex-1015 ¶15. That is, Yeung teaches one possibility is starting the recorder, when it reaches a predetermined orientation ***after*** it has completed a predetermined movement.

134. A POSITA would have been motivated to use Ruiz's double flip delimiter motion to indicate or confirm that the watch/recorder had ***intentionally*** been placed in the "predetermined orientation" and that the user desires to activate the audio recorder. For example, Ruiz's double flip delimiter input would be added after a user raised the watch/recorder to their mouth such that after doing so, a user would quickly turn the watch/recorder away from their face, pause at the bottom of the movement, and then return the watch/recorder to be oriented towards their face, as taught by Ruiz before pausing again at the top, as taught by Yeung. Ex-1006, 2:39-47, 4:42-5:4, 6:3-45; 16:62-66. I have illustrated this movement, and how it corresponds to the double flip in Ruiz, in the series of images based on Yeung's Figure 6 and Ruiz's Figure 1B below.



Ex-1005, Fig. 6 (left and right images). The middle image and arrows have been added to illustrate the wristturn of Yeung-Ruiz.

135. Using Ruiz's delimiter input in the context of a watch/recorder, as disclosed by Yeung, would have been recognized by a POSITA as a prime application of the delimiter input fitting within the scope contemplated by Ruiz, which is clear that the precise delimiter and how it is used is dependent on the application in which it is used. *See, e.g.,* Ex-1006, 16:27-62. Adding the delimiter input would avoid false positives as taught by Ruiz because it is not a movement that

would be likely to occur during normal usage of the watch unless the user wanted to activate the recording functionality. For example, other motions such as a quick flip of the wrist that might occur if the user is simply reaching overhead for something that might otherwise trigger the recorder functionality would not be followed by the delimiter input and thus would not lead to unnecessary mode switches. Ex-1005 ¶47; Ex-1006, 2:22-63. Other natural movements where a user would not want to trigger the recording functionality include a user simply checking the time—a potential false positive scenario that illustrates the value a POSITA would see in adding a delimiter, particularly one that can be accomplished quickly as flipping the wrist back and forth. In other words, imposing Ruiz’s delimiter input into Yeung’s predetermined movement pattern would reduce the number of false switches to the higher power mode in which Yeung’s watch recorder is on, thereby conserving battery life.

136. Thus, a POSITA would have been motivated to improve Yeung’s watch/recorder by modifying its algorithm for changing power modes by applying Ruiz’s double flip delimiter input. This addition would complement Yeung’s requirement that the watch also remain static in the final position for a particular duration before the watch/recorder is powered on and that the mode switch may be preceded by a “predetermined movement.” Ex-1005 ¶¶46, 52. Indeed, that Yeung already includes a “static hold” disclosure would be recognized by a POSITA as

motivating because it demonstrates Yeung's intent to minimize false positives but would not apply to all scenarios, such as the checking time scenario discussed above.

137. A POSITA would have had a reasonable expectation of success in combining these teachings of Ruiz and Yeung because each purports to solve the problem of excessive or unnecessary mode switches or false positive gesture detection in similar and predictable ways, namely, by requiring the device to be oriented within particular angle ranges for particular time durations before effectuating a mode change. Ex-1005 ¶¶15, 46-48, 52; Ex-1006, Abstract, 2:22-67, 4:31-5:20, 16:37-17:13.

138. A POSITA would have understood that they could have combined these teachings with no change in their respective functions because they teach compatible systems. For example, although Ruiz teaches its double flip delimiter in the context of a phone, it explains that “[c]omputing device 550 is intended to represent various forms of mobile devices, such as personal digital assistants, cellular telephones, smart phones, and other similar computing devices,” which a POSITA would understand to also include a watch/recorder, because it was well-known to apply technologies found in other electronic devices to wristwatches, as described above. *See supra* §V.A.

139. Moreover, Ruiz teaches that the double flip delimiter input does not necessarily require flipping the electronic device 180 degrees, but rather may simply

involve a situation where the device is “in a position so that a graphical display of the electronic device faces a user of the electronic device both before the device is rotated in the first direction and after the device is rotated in the second direction.”

Ex-1006, 3:13-20.

140. Finally, a POSITA would have had an expectation of success because Ruiz specifically employed the double flip delimiter in part because it could take advantage of “motion-based inputs sensed by motion sensors ... such as accelerometers” already commonly used in electronic devices at the time of the ’085 Patent and specifically used in Yeung’s watch/recorder. *See* Ex-1006, 1:21-40, 7:60-65, 10:55-59, 12:43-53; Ex-1005 ¶¶15, 36, 37, 46. For example, Ruiz teaches that one of its goals was to “create a delimiter [motion] that is not dependent on hardware but instead relies on the sensors commonly available in today’s smart phones.” Ex-1006, 16:41-44. Thus, given that there are no needed technologies in Ruiz not present in Yeung, a POSITA would have expected that the accelerometer and other processing hardware already present in Yeung, which is capable of detecting predetermined movements and orientations—could have readily been used to implement Ruiz’s technique. *See* Ex-1045; Ex-1056. Accordingly, a POSITA would have understood that their teachings could be combined with little to no change in their respective functions.

141. Although Ruiz includes embodiments directed to smart phone devices, as illustrated in Figure 1(B), a POSITA would have understood that its disclosures would be equally applicable to a watch/recorder as disclosed by Yeung. A POSITA would have been motivated to implement the teachings of Ruiz on a wristwatch, such as disclosed by Yeung, as a POSITA would have understood that Ruiz, with its double flip delimiter would further the goals expressed in Yeung of minimizing false positives and prevent unintentionally activating the recorder functionality based on inadvertent movements associated with a wrist-worn device and would therefore improve the user experience. Indeed, because a watch is continuously attached to its user the risk of inadvertent movements being interpreted as gestures is even greater than with a phone, which would have led a POSITA to include as many methods of resisting false positives as possible without adversely impacting user experience. The double flip of Ruiz can be done quickly and would become second nature to a user but provides a significant safeguard against false positives and, accordingly, would have been readily utilized by a POSITA in the context of Yeung's watch/recorder.

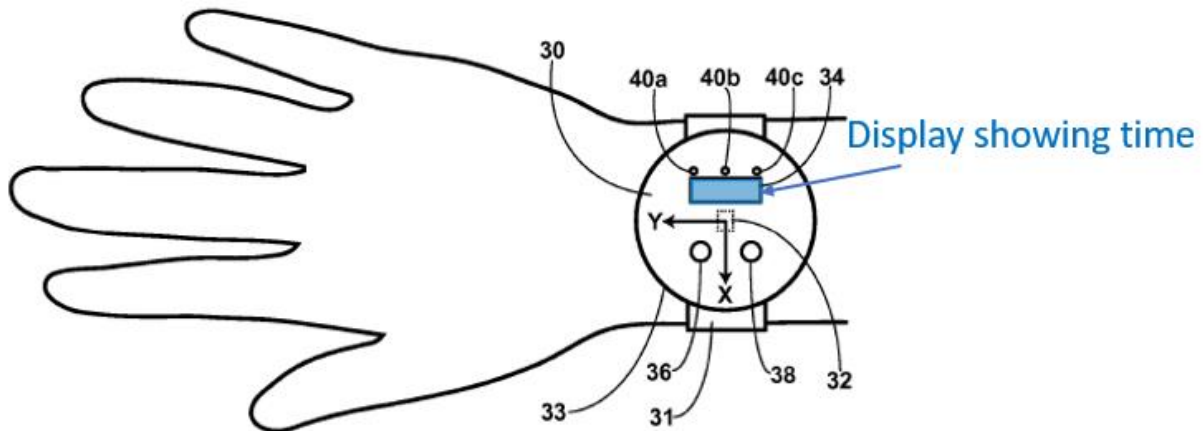
142. Implementing Ruiz in the wristwatch form factor described in Yeung would have been a straightforward engineering task, and a POSITA would have had a reasonable expectation of success in doing so. Indeed, a POSITA would have been aware that incorporating technologies from larger electronic devices into a watch

form factor had been done for many years with many different types of technologies and with technological success, as explained above in the Technical Background section. *Supra* §V.A. Such a combination especially lends itself to adding Ruiz’s double flip delimiter to Yeung because this would essentially amount only to a software change as Yeung already incorporates all of the hardware elements—such as a processor and accelerometer—needed for the change. As explained above, Yeung and Ruiz both disclose standard mobile computing devices that use accelerometers and for input gesture detection, making the combination a matter of straightforward engineering that would have predictable results. Moreover, watches incorporating various smart phone features were well-known in the art and would not have presented any obstacle. Thus, applying Ruiz to Yeung’s watch/recorder would have been well within the capabilities of a POSITA and would have been a matter of ordinary engineering and not the product of innovation.

2. Claim 1

a. Element 1[pre]: A method for switching a wristwatch from a first power mode to a second power mode, comprising:

143. Yeung-Ruiz discloses the preamble, to the extent it is limiting. Yeung is directed to “wearable devices, such as wrist-worn audio recorders and wristwatches,” as shown in Figure 1, which I have modified below to illustrate the time-telling function described by Yeung. Ex-1005 ¶¶14, 37.



Ex-1005, Fig. 1

144. Yeung’s watch/recorder includes “[a] display 34 on the front surface of audio recorder 30 [that] shows the time of day (hours, minutes, seconds), the date (month, date, day)” or “[a]lternatively, the hands for the hours, minutes, and seconds of an analog wristwatch may be used to show the time of day, in place of display 34.” Ex-1005 ¶37. Yeung discloses “switching a watch/recorder from a first power mode to a second power mode” in that Yeung’s “audio recorder activates audio recording only when it is in a predetermined orientation and/or after it has completed a predetermined movement.” Ex-1005 ¶¶15, 36.

145. A POSITA would have understood that when the audio recording functionality of the watch/recorder was disabled, this would be a lower-power “first power mode” and when the audio recorder activates, this would constitute switching to a higher-power “second power mode” because audio recording would consume

additional power compared to the state where audio recording was disabled due to additional circuitry being used and additional signal processing being required. For example, as described above in the technology background, battery life was a critical consideration to POSITAs at this time, particularly in the field of small portable or wearable electronics. *See supra* §V.B. Given that any circuitry consumes more power when on than in a powered off state, a POSITA would know that activating the voice recorder functionality must consume additional power. In particular, Yeung describes how the audio recording works. “A user records audio messages into microphone 36, and the analog audio signal from microphone 36 is converted to digital audio data by a sample-and-hold circuit 62 and an analog-to-digital converter 64.” Ex-1005 ¶42. Each of these steps would have consumed power. For example, a standard analog-to-digital converter available by 2011 would have been similar to the kind used by Yeung. Ex-1042. It was designed for “ultra low power and small size,” making it “ideal for battery-operated systems.” Ex-1042. It uses more power when sampling faster, and at a medium sampling rate of 75 kHz appropriate for audio, the device consumes 0.54 mW. *Id.* As disclosed in the datasheet, a number of package formats were available including MSOP-8, which would have dimensions (including pins) of about 3x5 mm, which would be suitable for including inside of a watch. *Id.*; *see also* Ex-1043. In addition, a POSITA would expect that additional power-hungry circuitry such as the screen may also be

activated in conjunction with the voice recorder, for example to allow the user to view the screen for the time of the recording or to execute commands such as pausing/resuming the recording. For example, Yeung notes: “A display 34 on the front surface of audio recorder 30 shows the time of day (hours, minutes, second), the date (month, date, day), or ***the current status (recording, playback, etc.) of audio recorder 30.***” Ex-1006 ¶37. These components would also contribute to additional power usage in this mode of operation.

146. More specifically, Yeung discloses that “indicators 40a, 40b, 40c at the front of housing 33 may be used to inform the user whether the recording is started at the beginning, the end, or somewhere in the middle of the audio-data record.” “Indicators 40a, 40b, 40c can be miniature LEDs (light-emitting diodes), and flashing of an indicator can be used to signal the user that audio recording is in process.” Ex-1005 ¶38. A POSITA would understand that activating these LEDs would consume additional power that was not used when the LEDs were not on. For example, a small LED available in 2000 as indicated by the copyright notice on the manufacturer’s datasheet uses more power when producing more light. Ex-1044. It uses up to 180 mW at 5.0 V when producing light. Ex-1044. As shown in this chart, it takes more current (and power) when it produces more light, and uses no current when not producing any light.

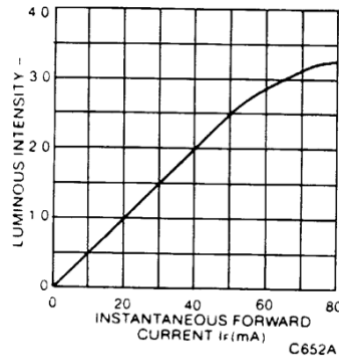
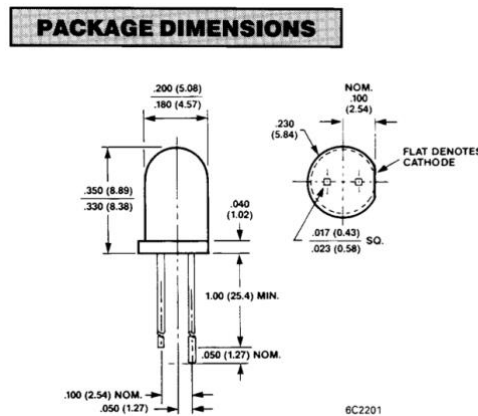


Fig. 2. Luminous Intensity vs. Forward Current

Given the small size of the light producing element, the electronic element of this product (in a smaller package) would easily fit in a watch.

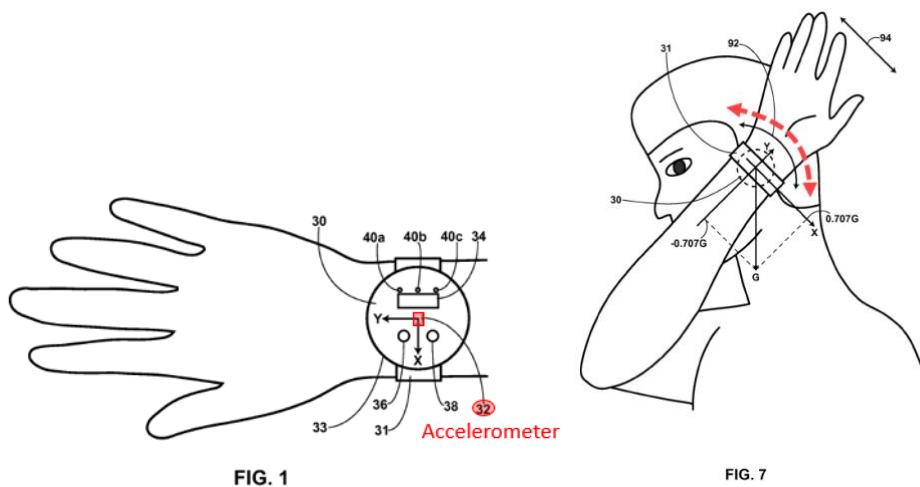


147. Furthermore, Yeung discloses that “the functions of indicators 40a, 40b, 40c can be incorporated into display 34, so that separate indicators 40a, 40b, 40c are not needed.” Ex-1005 ¶38. That would have taught a POSITA that the display would be activated and turned on, using substantially more power, when audio recording is started. This approach is further supported Yeung’s background section where it describes that “a motion-activated switch inside a wristwatch to turn

on or off the illumination of a wristwatch display” as described in referenced US Patent 3,939,640, cited by Yeung. Ex-1005 ¶11.

b. Element 1[a]: using an accelerometer for detecting a wristturn, and

148. Yeung-Ruiz teaches or discloses Element 1[a]. Yeung’s watch/recorder includes “an accelerometer for sensing the orientation and/or movement of the audio recorder.” Ex-1005 ¶¶15, 36. Yeung’s Figure 1 illustrates “a three-axis accelerometer 32 inside a housing 33 of audio recorder 30” that “senses acceleration in the three orthogonal axes X, Y, and Z. Ex-1005 ¶37. For example, Yeung’s accelerometer can detect “rotations of the wrist” (i.e., a “wristturn”) as shown in Figure 7. *Id.* ¶50.



Ex-1005, Figs. 1,

7

149. In other examples, Yeung detects a wristturn to initiate a mode switch. In these embodiments, data from the accelerometer is collected by an “analog multiplexer” under the control of a “recorder controller,” which determines what

actions should be taken on the basis of the accelerometer data. Ex-1005 ¶¶40, 46. For example, “recorder controller 48 uses the data stored in accelerometer-data memory 50 to compute the orientation and/or movement of audio recorder 30 and activates an audio-recorder function...only if a predetermined orientation and/or movement is detected.” Ex-1005 ¶46. In connection with Figure 6, Yeung explains that the watch/recorder activates a recording function after detecting a predetermined movement such as raising the arm from a resting position to the position shown in Figure 6, which would naturally involve a wristturn. Ex-1005 ¶¶40, 46; 47 (explaining that when “user naturally positions audio recorder 30 in front of his or her mouth the vector diagram indicates an angle of about 45 degrees”).

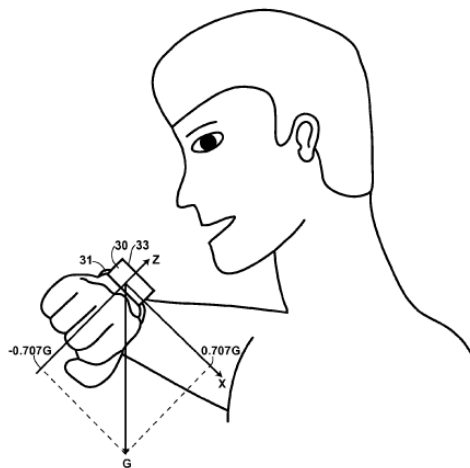


FIG. 6

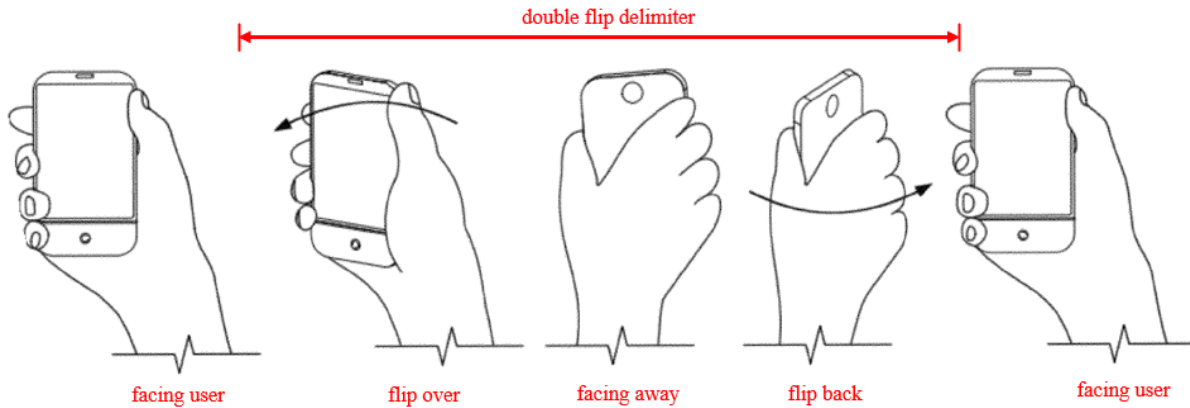
Ex-1005, Fig. 6

150. In the combined Yeung-Ruiz system, Yeung’s accelerometer would be used to detect the completion of the double flip delimiter gesture, which would be

as a “predetermined...movement detected” by Yeung, indicating that the user’s placement of the watch/recorder in the “predetermined orientation” is an intentional operation indicating a desire to activate the audio recording function. Ex-1005 ¶¶ 15, 46. A POSITA would have known that accelerometers are well-situated to detect motion and orientation angles. For example, Schlömer explains that an “acceleration sensor” is used “for gesture recognition.” Ex-1018, 11. The Schlömer paper notes that “more affordable hardware” had been developed to “detect motion and rotation in three dimensions through the use of accelerometer technology.” *Id.* I have described many other examples in the technology background section above. *See supra* §V.C.

151. Moreover, given that Yeung itself discloses an accelerometer to detect movement, as described above, it would be natural for a POSITA to use that same hardware already employed for detecting movement and acceleration in one context to also use it for detecting the delimiter input of Ruiz applied to Yeung’s device. Ruiz discloses that to execute the double flip gesture, “a user makes a first motion with the device and then backtracks through the motion, where the particular motion here involves rotating the device approximately 180 degrees about an axis of the device and then rotating it back substantially to its original orientation.” Ex-1006, 4:31-37; *see also id.*, 16:62-17:13. Figure 1B illustrate this double flip gesture in the context of a phone. *See, e.g.*, Ex-1006, 4:31-5:4, 6:3-45, 16:62-66. Ruiz further

notes that the actual amount of angular rotation used to make the delimiting gesture can be tuned to the user's natural motion. See Ex-1006, 5:50-60.

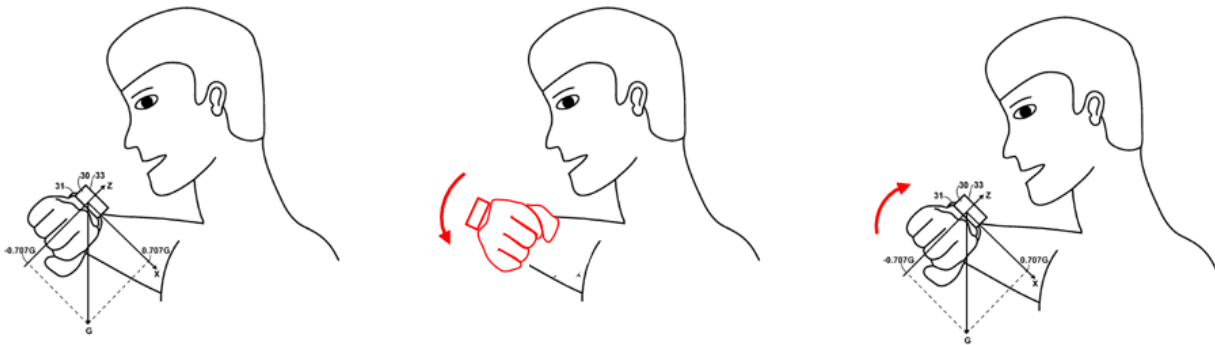


Ruiz Figure 1B

152. A POSITA would have understood that Ruiz's delimiter gesture could be applied easily to the context of a watch/recorder rather than a phone, as shown in Figures 1A and 1B. Indeed, a delimiter could be any motion "that is natural but is not likely to occur by accident" and that the technique taught by Ruiz could be generalized to different electronic devices and different usage contexts by using different delimiter inputs. Ex-1006, 2:25-29. A number of the references discussed in the technological background section above discuss the use of trigger gestures that accomplish a similar goal. See, e.g., Ex-1022, 4-5; Ex-1033, ¶50. Ruiz itself generalizes its preferred delimiter by indicating that it requires "the electronic device is in a position so that a graphical display of the electronic device faces a user of the electronic device both before the device is rotated in the first direction and after the device is rotated in the second direction" and later sets forth criteria of a good

delimiter. *See, e.g.*, Ex-1006, 3:13-17; 16:27-61. For example, Ruiz discloses that the double flip delimiter is advantageous because it is “a gesture that is unlikely to occur during normal use of the phone,” “is not dependent on hardware but instead relies on the sensors commonly available,” is “unique so that it does not collide with a gesture that makes more sense in another context,” and that it results in the screen being “visible after completing the gesture,” to allow the user to interact with the device once the gesture has been completed. Ex-1006, 16:41-58; *see also id.*, 1:28-29, 7:60-65. Indeed, in Ruiz the double flip motion is detected with an accelerometer or similar sensor. Ex-1006, 10:44-55, 12:53-65.

153. Thus, the specific wristturn of the YeungRuiz double flip delimiter motion would be detected by an accelerometer. Specifically, a POSITA would understand that the double flip would involve a wristturn starting from the position shown in Figure 6, rotating the wrist such that the watch/recorder faced away from the user, and then returning the watch/recorder to face towards the user, as shown in Figure 6. *See* Ex-1005, Fig. 6. This is because in the context of a watch/recorder, the orientation shown in Yeung’s Figure 6 is analogous to holding a phone pointed toward the user’s face, as in the leftmost image of Ruiz’s Figure 1B, as if to view the time. And rotating the wrist about 90 degrees to point the watch/recorder face away from the user is analogous to the center image of Ruiz’s Figure 1B, where the phone is facing down. I have illustrated this sequence below:



Ex-1005, Fig. 6 (left and right images). The middle image and arrows have been added to illustrate the wristturn of Yeung-Ruiz.

- c. **Element 1[b]: switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected,**

154. Yeung-Ruiz teaches or discloses Element 1[b]. Yeung discloses that “the audio recording function of audio recorder 30 turns on automatically when the user positions audio recorder 30 in a predetermined orientation, such as the natural orientation for recording shown in FIG. 6, and/or after audio recorder 30 has completed a predetermined movement.” Ex-1005 ¶48; *see also id.*, ¶¶15, 36, 52. Additionally, the display can be activated as “the functions of indicators 40a, 40b, 40c can be incorporated into display 34” and those indicators “may be used to inform the user whether the recording is started at the beginning, the end, or somewhere in the middle of the audio-data record.” Ex-1005 ¶38.

155. As explained above in connection with element 1[pre], a POSITA would have understood that switching from a state where the audio recording functionality of the watch/recorder is not enabled to a state where the audio recorder

is enabled as well as using the display for informing the users about the recording to provide the function of indicators 40a, 40b, and 40c would constitute switching the watch/recorder from a lower-power “first power mode” to a higher-power “second power mode” because audio recording and using the display would consume additional power compared to the state where audio recording and the display was disabled, including continuous speech sampling, analog-to-digital conversion, and signal processing. *See supra* §VIII.A.2.a.

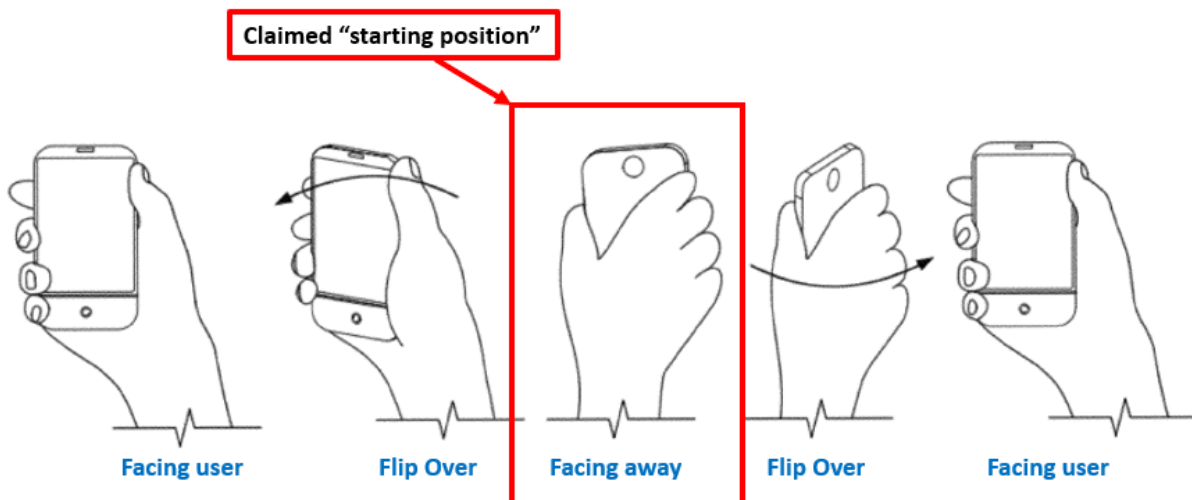
156. Thus, Yeung-Ruiz teaches this limitation in the same way as it is described by the patent which explains that the second power mode has higher power use than the first power mode, for example by being a “time display” mode as opposed to a “power saving” first power mode. Ex-1001, 6:2-6; *see also id.* 9:40-42 (“the wristwatch should be switched to a second power mode for example in order to activate the display.”). As described with reference to element 1[a], in the context of the Yeung-Ruiz combination, the power mode switch would occur after the double flip delimiter, which involves a wristturn. *See supra* §VII.A.2.b.

d. Element 1[c]: wherein said step of detecting a wristturn comprises:

157. Yeung-Ruiz teaches or discloses Element 1[c], as shown below, by detecting a wristturn based on the steps of Elements 1[c.1] – 1[c.3].

- e. **Element 1[c.1]: detecting that an orientation of the wristwatch is in a starting position, wherein said step of detecting that the orientation is in the starting position comprises detecting that the orientation of the wristwatch is held within a first range for a defined time;**

158. Yeung-Ruiz teaches or discloses Element 1[c.1]. As explained above, in the Yeung-Ruiz combination, a POSITA would have been motivated to add a double flip delimiter of rotating and holding the watch/recorder away from the user's face, and then rotating back and holding it towards the user's face before activating the recording functionality of Yeung's watch/recorder. *See supra* §§VIII.A.1, VIII.A.2.a. I have identified as the claimed "starting position" the portion of the double flip delimiter that occurs when the watch/recorder screen has been rotated away from the user, as shown in Figure 1B below.



Ex-1006, Fig. 1B

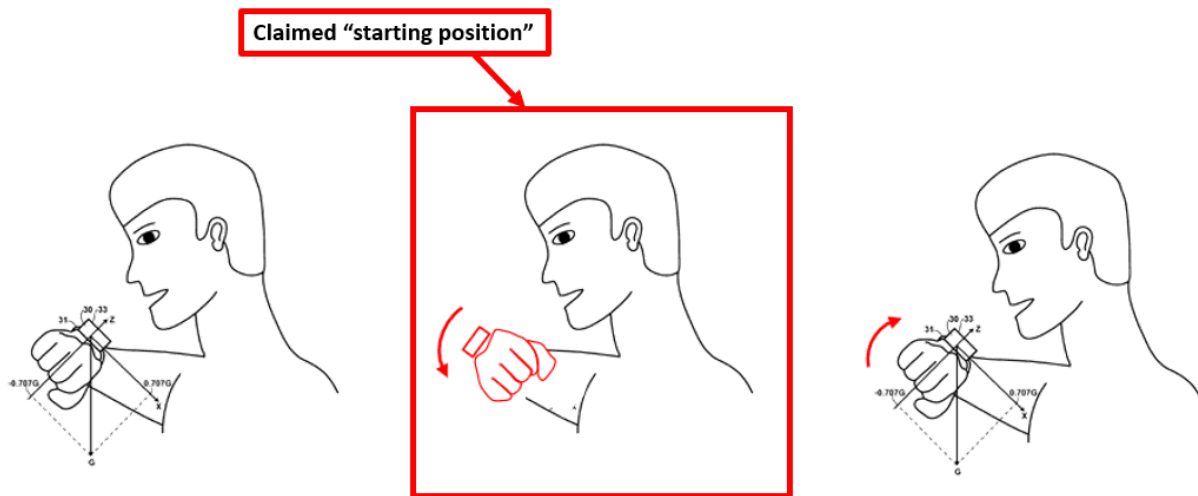
159. Because element 1[c] is a “comprising” term, I understand the claimed “wristturn” may include additional steps beyond those expressly claimed. Ruiz teaches what I call a “pre-start” orientation in which the device faces the user, followed by what I identify as the claimed “starting position,” which is the position in which the device is facing away from the user. A POSITA would understand that in the context of the claim “starting position” is simply a way to demarcate the beginning of the claimed wristturn and not necessarily the same as the beginning of movement generally. And in practice, performing just the “return” portion of the flip wouldn’t be possible until the user moved their wrist away from its resting position, so the full double flip would typically be executed anyway.

160. Alternatively, as described in the motivation to combine section, a POSITA would have understood that a delimiter could be other motions, as described by Ruiz: “The delimiting motion could be other motions, though will generally be selected from motions that are not commonly made accidentally by the user of a mobile device, so that the user’s device will change modes only when the user intends that it changes modes.” Ex-1006, 4:37-41; *see also supra* §VIII.A.1.

161. Ruiz explains that the orientation when the device is flipped so that it is oriented away from the user is detected. For example, Ruiz discloses “In instance (b), the user has rotated her hand while gripping the device in a normal manner, approximately 180 degrees counterclockwise (as viewed from the user’s arm). As a

result, the face of the smartphone is now pointing substantially downward toward the table or floor.” Ex-1006, 4:53-57. Ruiz teaches that a full 180 degrees may not be necessary to insure an intended delimiter motion, but rather “substantial compliance is acceptable ... so that a proper level of false positives or false negatives is maintained.” Ex-1006, 6:25-28. For example, “flipping a device more than 160 degrees total or [to] within 15 degrees from flat horizontal” could be acceptable. Ex-1006, 6:28-35. In other words, Yeung teaches “a first range” of acceptable positions.

162. Thus, in the Yeung-Ruiz combination, a POSITA would understand the first flip of the double flip puts the watch/recorder face of Yeung in the position of facing away from the user (below, center), analogous to Ruiz’s first flip of the phone into the face down position as shown below. *See supra* §VIII.A.1.



Ex-1005, Fig. 6 (left and right images). The middle image and arrows have been added to illustrate the wristturn of Yeung-Ruiz.

163. Beyond having an identifiable “starting position,” this element also requires “detecting” that the device is in the starting position by “detecting that the

orientation of the wristwatch is held within a first range.” Yeung-Ruiz also teaches this portion of the limitation. For example, Yeung discloses continuously detecting the orientation of the device by analyzing data gathered by the accelerometer. In a section of its specification called “Detection Operation,” Yeung explains: “At step 84, recorder controller 48 uses the data stored in accelerometer-data memory 50 **to compute the orientation** and/or movement of audio recorder 30 and activates audio-recorder function ... **only if a predetermined orientation** and/or movement **is detected.**” Ex-1005 ¶46. It would have been obvious to a POSITA based on this disclosure that in the Yeung-Ruiz combination where a double flip motion is added as part of Yeung’s predetermined movement, that the orientation information would similarly be gathered and computed for each portion of the double flip to ensure that the movement had been completed correctly prior to activating the recorder functionality. Ruiz discloses uses a “recognizer” algorithm that similarly gathers information from motion and orientation sensors like an accelerometer specifically to detect the “double flip,” which would lead a POSITA to expect that similar recognition techniques would work in the Yeung-Ruiz combination. Ex-1006, 10:44-55, 11:40-45, 12:61-64.

164. Yeung-Ruiz also teaches that this orientation at the away position of the flip is an “orientation ... within a first range.” For example, Ruiz explains that the angle required for this starting orientation is “rotation past a first threshold

orientation.” Ex-1006, 3:60-63. Thus, in Ruiz’s embodiment of a 180 degree double flip, a flip passing a threshold of 160 degrees is sufficient for the system to detect that a double flip is being executed because “substantial compliance is acceptable.” Ex-1006, 6:25-35. That is to say that a range beyond “certain degrees or radians of rotation” is sufficient trigger the system that the “away” portion of the double flip delimiter motion has been detected. Ex-1006, 5:37-39. Implementing a similar “threshold” scheme would have been obvious to a POSITA who would have recognized that humans do not make perfectly precise motions—thus in order to maximize user experience while still accomplishing the purpose of the double flip—eliminating false positives—a POSITA would have identified a range of angles in Yeung-Ruiz for the “away” portion of the double flip. In the context of a watch/recorder, like that disclosed by Yeung, a 180 degree flip would be impractical due to natural constraints on wrist mobility. However, it would have been obvious to a POSITA to choose a “first range” of orientations based on angles that would be comfortable for the user when rotating the wrist away. Indeed, Ruiz discloses that the actual amount of angular rotation used to make the delimiting gesture can be tuned to the user’s natural motion. See Ex-1006, 5:43-60.

165. For example, a POSITA may have chosen 45 degrees facing away, as shown above, as an analog to the face-down position of Ruiz because it is a natural wristturn motion from 45 degrees facing the user. Although a user can rotate the

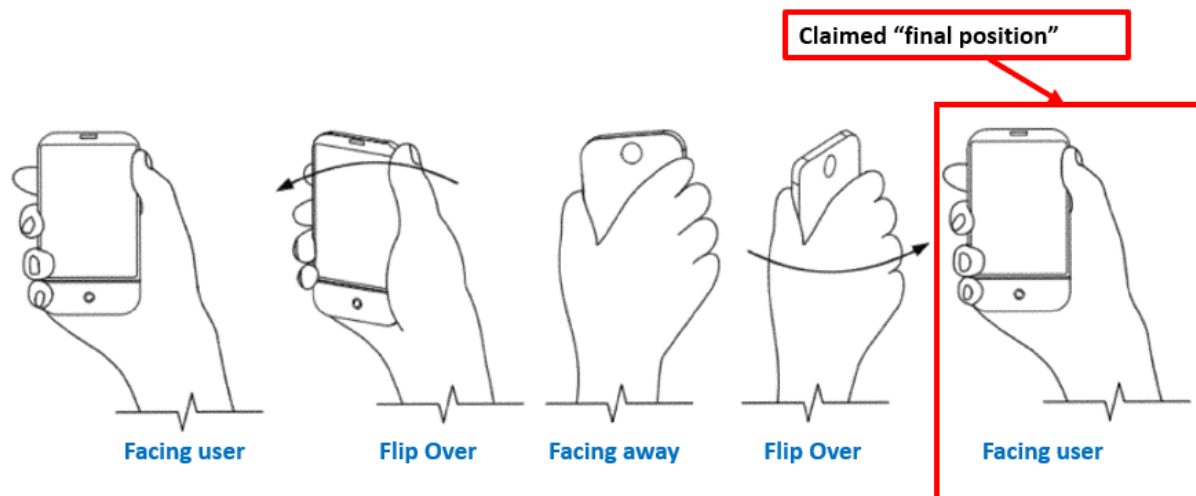
wrist further without substantial strain, a POSITA would have recognized that 45 degrees is a convenient angle because, it allows for some room for error on either side while striking a balance between a natural movement that is sufficiently distinct from positions the user would normally use (e.g., parallel with the horizontal) that it would eliminate a large number of false positives.

166. Yeung-Ruiz further discloses that the electronic device is “held” in this flipped “starting position” for “a defined time.” Regarding the “away” position of the double flip delimiter (i.e., the claimed “starting position”), Ruiz discloses that the “user may hold the device in this orientation ***for a time period***, which may be as little as a split instant.” Ex-1006, 4:53-63. The “time period” described by Ruiz is a defined time. Moreover, it would have been obvious to a POSITA that the “time period” described by Ruiz could be set to any defined time that enabled the position to be registered, as further described below with reference to Claim 5 and ensure the device was not merely passing through the “first range” as it would be if the user was moving their hands while holding or wearing the device. *See infra* §VIII.A.3.d. Components such as accelerometers typically have some amount of delay before they are able to register a position. For example, a typical accelerometer available by 2011 available in a small (6mm x 6mm x 1.98mm) package had a typical response time of 2.0ms. Ex-1045, 2; *see also* Ex-1056. Moreover, as described in the technology background, it is a feature of many gesture recognition protocols to

include certain timing requirements for purposes of eliminating false positives. See *supra* §§V.C-D.

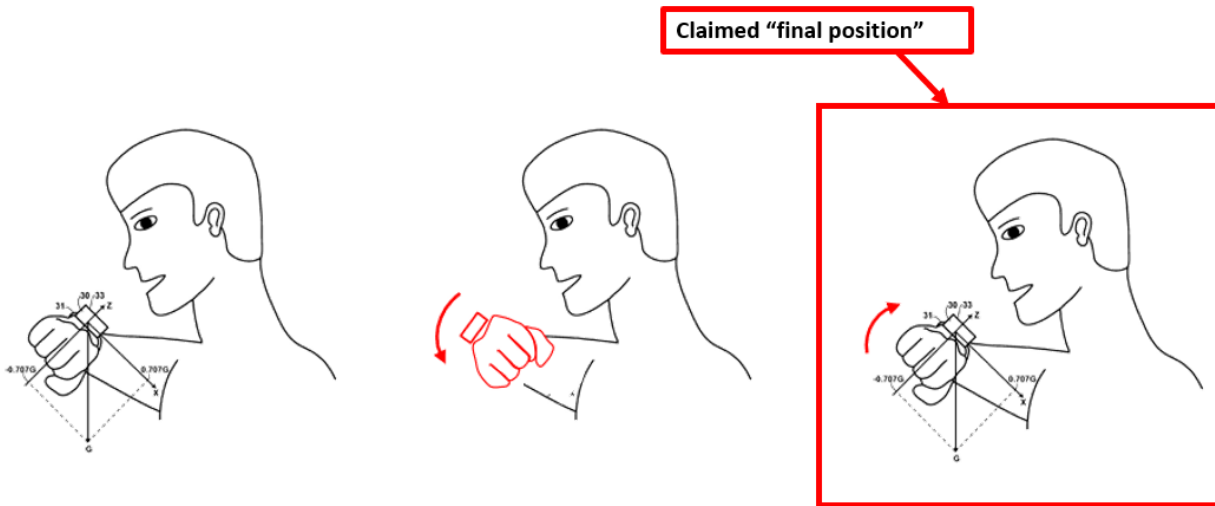
- f. **Element 1[c.2]: detecting that an orientation of the wristwatch is then in a final position, wherein said step of detecting that the orientation is in the final position comprises detecting that the orientation is in a second range different from said first range,**

167. Yeung-Ruiz teaches or discloses Element 1[c.2]. The claimed “final position” is the portion of the double flip delimiter gesture that occurs when the screen has been rotated back toward the user, as shown in Figure 1B of Ruiz below.



Ex-1006, Fig. 1B

168. In the Yeung-Ruiz combination, a POSITA would understand the second flip of the double flip puts the watch face of Yeung in the position of facing towards the user (below, right), analogous to Ruiz’s second flip of the phone into the face up position as shown above



Ex-1005, Fig. 6 (left and right images). The middle image and arrows have been added to illustrate the wristturn of Yeung-Ruiz.

169. Beyond having an identifiable “final position,” this element also requires “detecting” that the device is in the final position by “detecting that the orientation is in a second range.” Yeung-Ruiz also teaches this portion of the limitation. For example, Yeung discloses continuously detecting the orientation of the device by analyzing data gathered by the accelerometer. In a section of its specification called “Detection Operation,” Yeung explains: “At step 84, recorder controller 48 uses the data stored in accelerometer-data memory 50 **to compute the orientation** and/or movement of audio recorder 30 and activates audio-recorder function ... **only if a predetermined orientation** and/or movement **is detected**.” Ex-1005 ¶46. In particular, Yeung discloses that the “predetermined orientation” is “**the natural orientation for recording shown in FIG. 6**” above. Ex-1005 ¶48; see also *id.*, ¶¶15, 47. It would have been obvious to a POSITA based on this disclosure

that in the Yeung-Ruiz combination where a double flip motion is added as part of Yeung's predetermined movement, that the orientation information would similarly be gathered and computed for each portion of the double flip to ensure that the movement had been completed correctly prior to activating the recorder functionality. Ruiz discloses uses a "recognizer" algorithm that similarly gathers information from motion and orientation sensors like an accelerometer specifically to detect the "double flip," which would lead a POSITA to expect that similar recognition techniques would work in the Yeung-Ruiz combination. Ex-1006, 10:44-55, 11:40-45, 12:61-64.

170. Yeung-Ruiz also teaches that this orientation at the toward position of the double flip is an "orientation ... in a second range." For example, Ruiz explains that the angle required for this final orientation occurs when the device is "rotated in a second direction of rotation that is substantially the opposite of the first direction of rotation, past a second threshold." Ex-1006, 3:63-65. Thus, in Ruiz's embodiment a threshold may be "degrees relative to the original flipping motions, such as +/-15 degrees from the initial rotation motion" or "a certain orientation relative to the starting orientation." Ex-1006, 6:3-12. As explained above, "substantial compliance is acceptable." Ex-1006, 6:25-35. Implementing a similar "threshold" scheme would have been obvious to a POSITA who would have recognized that humans do not make perfectly precise motions—thus in order to

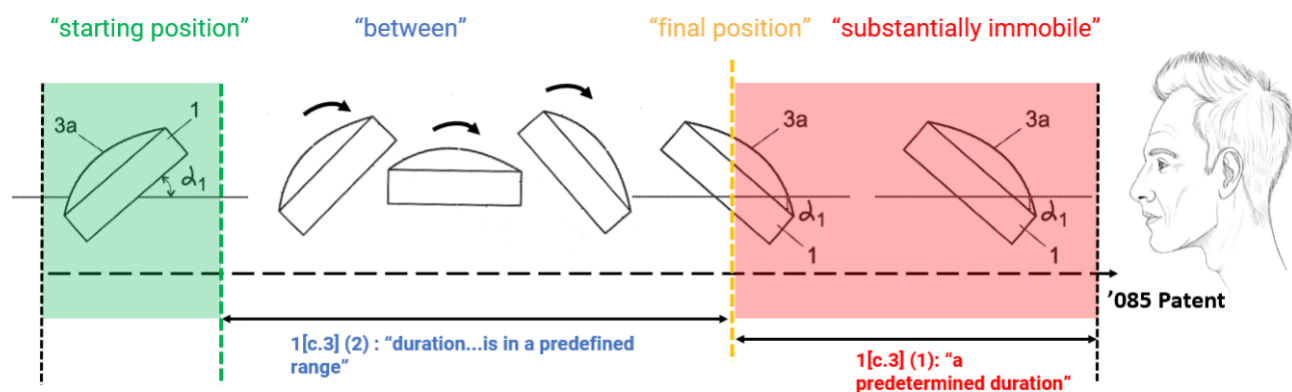
maximize user experience while still accomplishing the purpose of the double flip—eliminating false positives—a POSITA would have identified a range of angles in Yeung-Ruiz for the “toward” portion of the double flip. In the context of a watch/recorder, like that disclosed by Yeung, a 180 degree flip would be impractical due to natural constraints on wrist mobility. However, it would have been obvious to a POSITA to choose a “second range” of orientations based on angles that would be comfortable for the user when rotating the wrist so that the watch/recorder faced the user. Indeed, Ruiz discloses that the actual amount of angular rotation used to make the delimiting gesture can be tuned to the user’s natural motion. See Ex-1006, 5:43-60.

171. This “second range” of orientations must be detected as “different from the first range,” as required by the claim. A POSITA would have understood that the double flip motion described by Ruiz operates by using motion sensors to detect two different threshold orientations. “The module is programmed to use information from the motions sensors to determine whether the electronic device has been: (a) rotated in a first direction of rotation *past a first threshold orientation*, and (b) rotated in a second direction of rotation that is substantially opposite of the first direction of rotation, *past a second threshold*.” Ex-1006, 3:60-65. Thus a POSITA would have understood that, as applied to Yeung-Ruiz, the second range of

orientations must be detected as different than the first range of orientations in order to confirm that a double flip motion has occurred.

- g. Element 1[c.3]: in response to a detection that the orientation of the wristwatch is in the second range, detecting that the wristwatch remains substantially immobile during a predetermined duration and that a duration between the starting position and the final position is in a predefined range.**

172. Yeung-Ruiz teaches Element 1[c.3]. This claim element requires two additional, separate timing requirements related to the wristturn be detected in response to detecting the orientation of the wristwatch in a second range in claim 1[c.2]—(1) the wristwatch must remain “substantially immobile” during a predetermined duration in the final orientation range and (2) the “duration between” the starting and final positions must be in a predefined range. I have addressed these requirements in chronological order (i.e., from left to right).



Ex-1001, Figs. 7a (left) and 7b/7c (right). The images in the middle, rotation arrows, and face have been added to illustrate the timing and orientation requirements for Claim 1's wristturn.

“duration between”

173. First, as shown above, Yeung-Ruiz teaches that the duration between the starting position and the final position is in a “predefined range.” As described above, a POSITA would have been motivated to add Ruiz’s double flip delimiter movement to Yeung’s “predetermined movement” required to activate the recorder. *Supra* §VIII.A.1. Ruiz discloses detecting that the period of time from when the user begins the double flip to when the user completes the double flip is **within** a predefined range of 200 ms (purple arrow in the illustration below). Ex-1006, 8:61-65. Because Ruiz teaches the entire delimiter gesture (the **double flip**) to be completed within 200 ms , the duration between the “starting position” and final position in Element 1[c.3] (2) (“**predefined range**”) must necessarily be completed in less than 200 ms, as shown below.

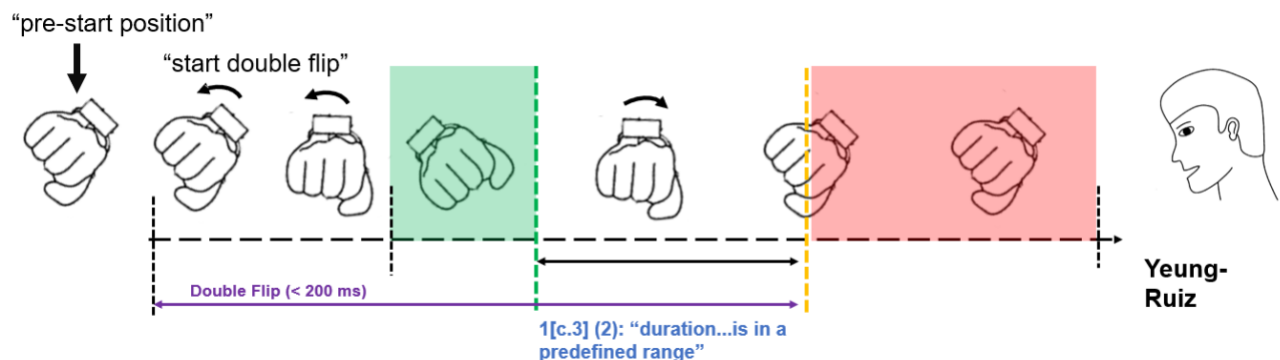


Illustration based on Ex-1005, Fig. 6 showing the implementation of Ruiz’s “double flip” in the context of the Yeung-Ruiz combination.

174. For example, if the flip portion of the double flip was done in 75 ms and the time held at the bottom of the flip before returning was 50 ms, a POSITA would understand that the time from the claimed starting position to the final position must be measured at less than 75 ms in order to meet the 200 ms requirement. Thus, completing the double flip within 200 ms of the user first placing the watch/recorder in the proper orientation (“pre-start”) would confirm the user’s intention to begin recording.

175. This is how Ruiz discloses utilizing the double flip delimiter as well. For example, Ruiz describes a case where the delimiter gesture (the double flip) is used to capture a preceding motion gesture: “Where the delimiter follows the other inputs, motion-based data may be cached across a trailing window of time on a device, and ***if a delimiter input is received within a predetermined time period of such input (e.g., 200 ms)***, the data in the cache may be processed.” Ex-1006, 8:61-65. I note that although 200 ms would be a reasonable amount of time in which to complete the double flip using the Yeung watch, a POSITA would understand that the combination need not use exactly that period of time. For example, a number of references discussed in the technology background, including Schlömer explain that empirical evidence may be used to determine the proper period of time which can be used to train the device. Ex-1018, 13-14. Similarly, Sachs recognizes that even when there is a particular period of time required in performing a sequence of

movements, relative timing can adjust for individual differences between user's natural movement to provide an enhanced user experience. Ex-1033, ¶¶78-79. Another example of a quick gesture is a "shake" of a mobile phone as described in a 2004 paper. Ex-1054. "We detect a shake by looking at the frequency of each 200 ms sample." Any gesture that produces at least 3 Hz of motion with greater than a net .8 g of magnitude is considered a shake." Ex-1054, 159.

176. Of course, a POSITA would have understood that another time period could be used, so long as the entirety of the double flip was completed within a relatively short time. In this way a POSITA would understand that the risk of interpreting random or unintended movements as a complete double flip would be minimized while also allowing the user predictability in knowing how to perform (or avoid performing) the double flip motion. Ruiz's disclosures regarding the double flip being a natural movement that would not be normally executed would have further informed a POSITA's opinion in this regard. See Ex-1006, 16:46-50.

"substantially immobile"

177. Yeung-Ruiz also discloses the first portion of this limitation by requiring the watch/recorder to remain in a static position after the required position is detected. For example, Yeung teaches: "To minimize accidental activation of these audio-recorder functions by normal daily activities, recorder controller 48 can be designed to activate an audio-recorder function such as recording or playback

only after audio recorder 30 remains in a static position for a predetermined period of time after a predetermined wrist and arm movement pattern has been detected.”

Ex-1005 ¶52.

178. A POSITA would have understood “substantially immobile” to mean that the watch/recorder remains within the second range for the predetermined duration and would have understood Yeung’s “static position” disclosure to meet this limitation. A POSITA would have understood that it does not make any sense to refer to an object as “static” when referring to a particular instant in time because during any particular instant even an object in motion would appear to be immobile. Yeung also teaches that sensing a position requires holding the watch-recorder steady enough that several accelerometer sampling periods can be completed to confirm a hold in a certain orientation. *See* Ex-1005 ¶49. A POSITA would have chosen the predetermined time as long enough to confirm the final position was intended and the watch/recorder was not simply passing through the final position, as if to lay it face down on a table. Thus, a POSITA would understand Yeung’s disclosure to be referring to the absence of movement over some period of time, even if brief. Further a POSITA would have expected the period of time to be perceptible to the user, so that the user could be confident in doing the required movement pattern correctly. Otherwise, the user would not know that the wrist is in a “static position.” The timeline below illustrates how Yeung-Ruiz aligns with the

entire sequence of movements required by Claim 1, including the two timing requirements claimed in Element 1[c.3].

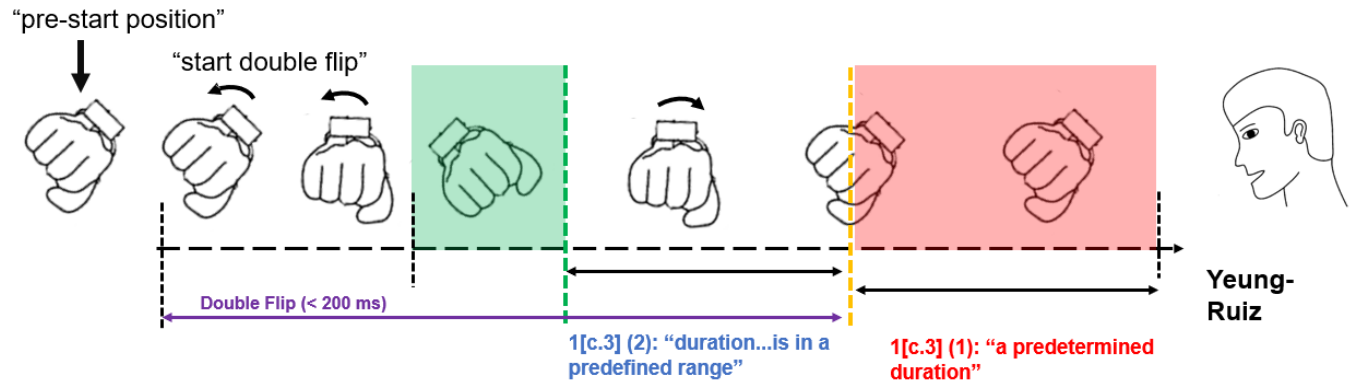


Illustration based on Ex-1005, Fig. 6 showing the implementation of Ruiz's "double flip" in the context of the Yeung-Ruiz combination.

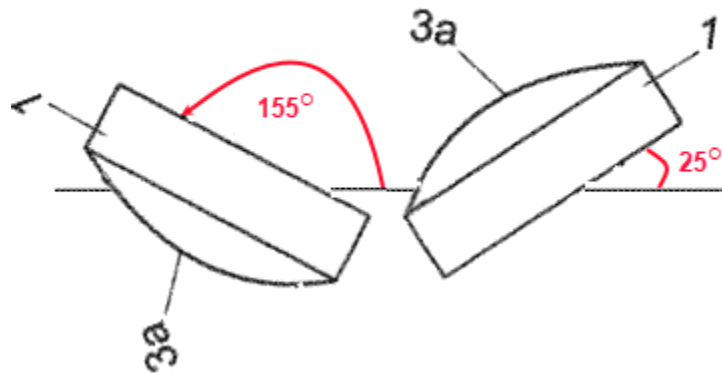
179. Thus, Yeung-Ruiz renders claim 1 obvious

3. Dependent claims 2-10

- a. **Dependent Claim 2: The method of claim 1, wherein said first range is an angle range from 25° to 155° relatively to the horizontal.**

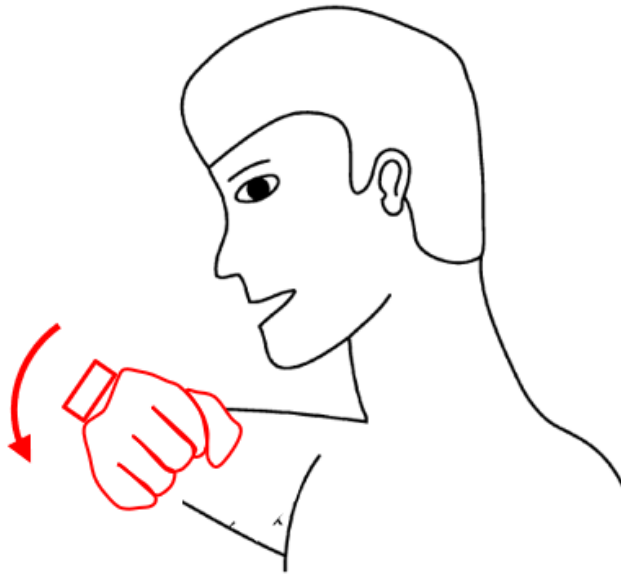
180. Yeung-Ruiz discloses or renders obvious Claim 2. Based on the specification, a POSITA would have understood that 25 degrees to 155 degrees include angles at which the watch/recorder face is oriented away from the user as shown in the figures below that I created based on Figure 7a (where the user's face is understood to be to the right of the watch face). See Ex-1001, 9:58-10:9. As can be seen below from the position where the watch/recorder is held parallel to the ground and in front of the user, 25 degrees would constitute slightly tipping the

watch/recorder away from the user, while 155 degrees would require tipping the watch/recorder nearly upside down.



'085 Patent, Fig. 7a modified to show angles required by Claim 2.

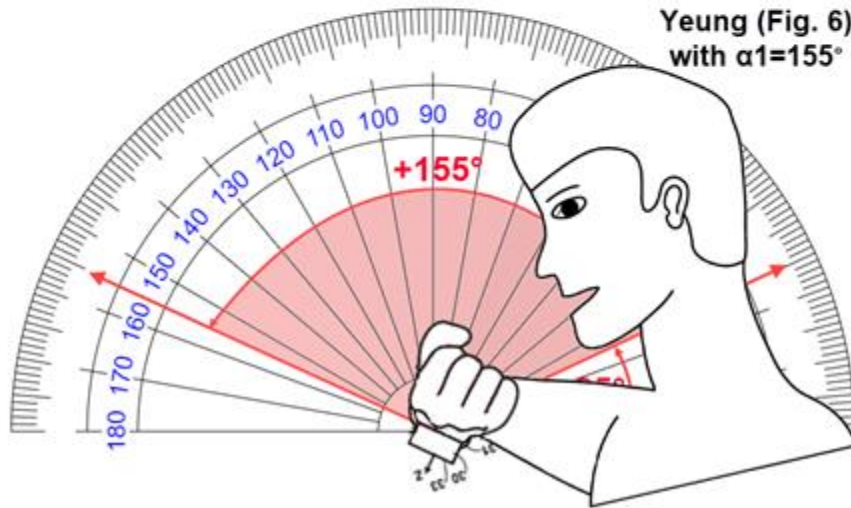
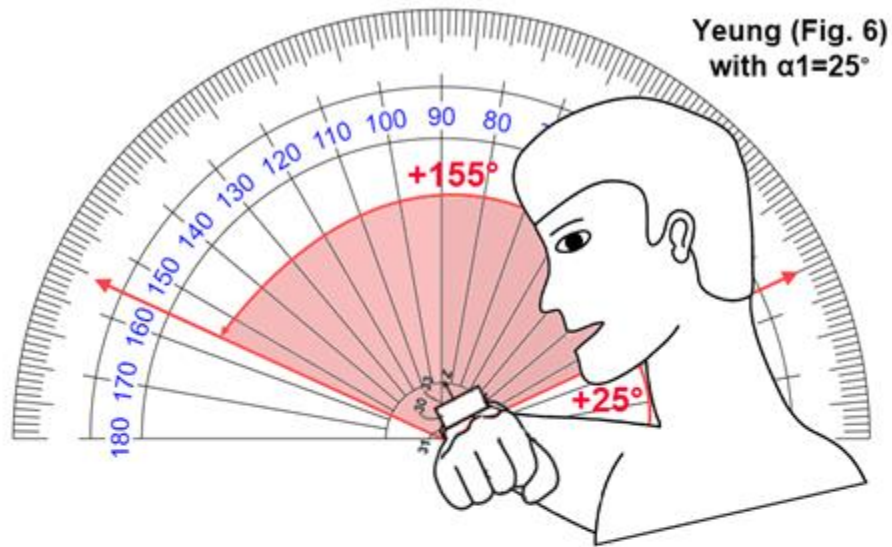
181. As explained above with reference to element 1[c.1], which requires detecting an orientation of the wristwatch is held within a first range, a POSITA would understand that when applied to Yeung the double flip delimiter motion described in Ruiz would result in the watch/recorder being oriented away from the user as shown in the modified version of Yeung's Figure 6 below. *See supra* §VIII.A.2.e.



Ex-1005, Fig. 6 (modified to show the watch position at the away position of the double flip)

182. The range of orientations that would serve as the “starting position” in Claim 1 (i.e. with the watch/recorder faced away from the user) would fall within the claimed 25 to 155 degree range. For example, in the modified Figure 6 above, the watch/recorder is oriented at about a 45-degree angle. As explained above (§VIII.A.2.e), Ruiz explains that for the double flip delimiter “substantial compliance” with the designated range is “acceptable,” such that, for example, if a 180 degree rotation away is nominally required, any rotation past 160 degrees would be recognized as the “away” portion of the double flip. Ex-1006, 6:23-35. A POSITA would have similarly been motivated to include a range of orientation angles because humans naturally make any gesture with some degree of variability. Thus, utilizing a range of acceptable orientation angles would have been obvious.

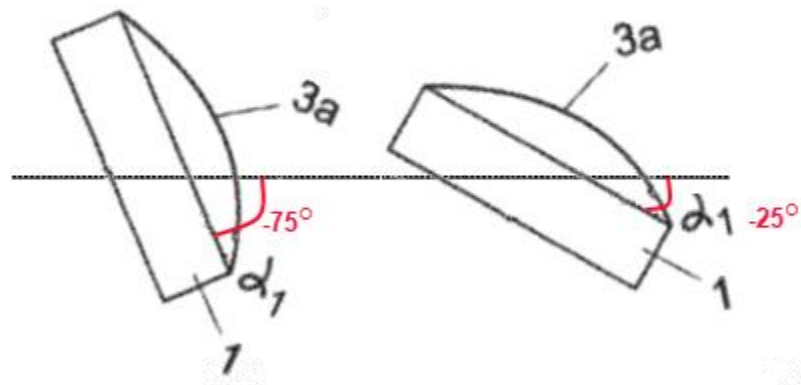
183. To the extent that this claim requires not only that the claimed “first range” be within 25 and 155 degrees but instead requires the “first range” be exactly 25 to 155 degrees, it would have been obvious to a POSITA to use 25 to 155 degrees or would have at least been obvious to try. This is because angles less than 25 degrees would not indicate intentionality in making the gesture while angles beyond 155 degrees would be uncomfortable for the user. For example angles less than 25 degrees would result in a user barely rotating the watch/recorder way and defeating the purpose of a movement that is not regularly done in normal use. On the other hand, an angle beyond 155 degrees would put the user’s arm in an unnatural position and also defeat the purpose of Ruiz’s delimiter that the motion be easy to perform, as described above. *See supra* §VIII.A.2.e. The Figures below illustrate these positions in the context of Yeung’s Figure 6, which demonstrates how these angles correspond to the outside edge of the range of natural positions that involve the watch facing away from the user while not putting undue strain on the user’s arm.



184. A POSITA experimenting with an ideal range of angles would have tried the range of 25 to 155 degrees for the reasons above. Moreover, these angles would be natural to try because a POSITA would have likely experimented with whole number angle ranges and increments of five degrees would be natural to try. Given these criteria, there are a limited number of options that a POSITA would try and the range of 25 to 155 degrees is one of these options.

- b. Dependent Claim 3: The method of claim 1, wherein said second range is an angle range from -25° to -75° relatively to the horizontal.**

185. Yeung-Ruiz discloses or renders obvious Claim 3. Based on the specification, a POSITA would have understood that -25 degrees to -75 degrees are angles at which the watch/recorder face is oriented toward the user as shown in the figures below, which I modified based on Figure 7b. Ex-1001, 10:4-9. As can be seen below from the position where the watch/recorder is held parallel to the ground and in front of the user, -25 degrees would constitute slightly tipping the watch/recorder towards the user, while -75 degrees would require tipping the watch/recorder nearly vertical.



186. As explained above with reference to element 1[c.2], which requires detecting the orientation of the wristwatch in a second range different from the first range, Yeung discloses activating the recorder when the watch/recorder is “in a

predetermined orientation, such as the natural orientation for recording shown in FIG. 6, and/or after audio recorder 30 has completed a predetermined movement.”

Ex-1005, ¶48; see also *id.*, ¶¶15, 47.

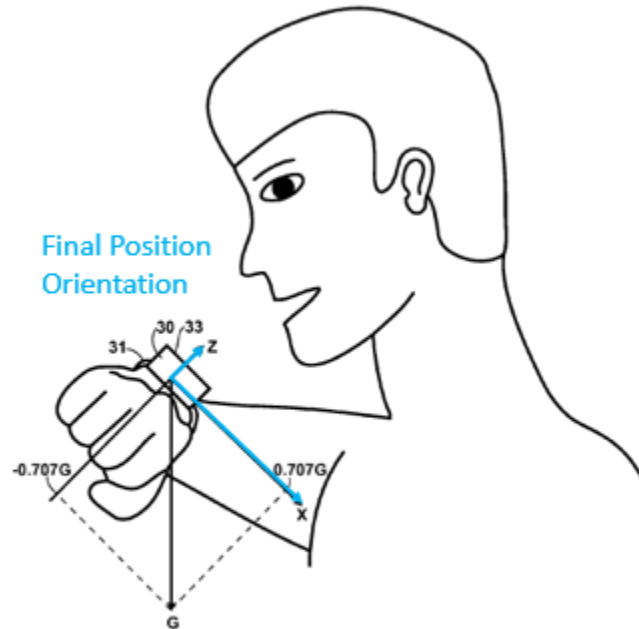


FIG. 6

Ex-1005, Fig. 6

187. Yeung explains that in this position, the x-component of its orientation, which a POSITA would have understood as corresponding to the plane of the cover glass on the face of the watch, is 45 degrees: “***Since the angle between the X-axis and the direction of the gravitational acceleration G is about 45 degrees,*** the X component of the gravitational acceleration G is approximately $G \cos 45^\circ$, which is equal to $0.707 G$, as illustrated in the vector diagram in FIG. 6.” Ex-1005 ¶45. A

POSITA would have understood that 45 degrees from the direction of the gravitational acceleration would have corresponded to -45 degrees from the horizontal in the angle conventions of the '085 Patent and thus fall within the claimed range of -25 to -75 degrees. Moreover, as explained above, it would have been obvious to a POSITA to include a range of acceptable orientation angles and any such range would naturally fall within the range in Claim 3. Indeed, any less than this range risks false positives and has the added drawback of being difficult for the user to see. Any further than this angle range would result in an awkward position in which the user would turn their wrist beyond what is comfortable.

188. To the extent that this claim requires not only the claimed “second range” within -25 and -75 degrees but instead requires the second range be exactly -25 to -75 degrees, it would have been obvious to a POSITA to use -25 to -75 degrees or would have at least been obvious to try for these same reasons: angles less than -25 degrees would not allow the user to see the watch face well. Using this wide range would ensure the likelihood that a user could reliably perform the gesture within this range. Having an endpoint to the range would allow a user to cancel the gesture by moving their wrist past the end of the range.

- c. **Dependent Claim 4: The method of claim 1, wherein said step of detecting that the wristwatch remains substantially immobile during a predetermined duration comprises: detecting that an orientation of the wristwatch is held in a range from -25° to -60° relatively to the horizontal during said predetermined duration.**

189. Yeung-Ruiz discloses or renders obvious Claim 4. Based on the specification, a POSITA would have understood that -25 degrees to -60 degrees are the angles at which the watch/recorder face is oriented toward the user. Ex-1001, 10:4-9, Figs. 7b, 7c. Moreover, the “predetermined duration” referred to here corresponds to the time required in Element 1[c.3] in which the watch/recorder remains “substantially immobile” in the final position orientation range.

190. As explained above with reference to Element 1[c.3], regarding detecting the orientation of the wristwatch in the second range, Yeung discloses the watch/recorder is “designed to activate an audio-recorder function such as recording or playback *only after audio recorder 30 remains in a static position for a predetermined period of time after a predetermined wrist and arm movement pattern has been detected.*” Ex-1005 ¶52; *supra* §VIII.A.2.g. As explained with reference to Claim 3, which requires detecting a second range of orientations, in Yeung this final position corresponds to -45 degrees from the horizontal, which falls within the claimed range of -25 to -60 degrees. *See, e.g.*, Ex-1005, ¶45; *supra* §VIII.A.3.c. Moreover, as explained above, it would have been obvious to a

POSITA to include a range of acceptable orientation angles and any such range would naturally fall within the range in Claim 4. Indeed, any less than this range risks false positives and has the added drawback of being difficult for the user to see. Any further than this angle range would result in an awkward position in which the user would turn their wrist beyond what is comfortable.

191. To the extent that this claim requires not only the claimed “second range” within -25 and -60 degrees but instead requires the second range be exactly -25 to -60 degrees, it would have been obvious to a POSITA to use -25 to -60 degrees or would have at least been obvious to try for these same reasons: angles less than -25 degrees would not allow the user to see the watch face well, while angles beyond -60 degrees would be uncomfortable for the user to hold for a predetermined duration.

d. Dependent Claim 5: The method of claim 1, wherein said defined time is 50 ms

192. Yeung-Ruiz renders obvious Claim 5. The “defined time” in Claim 5 is the time that the device remains in the starting position. As shown below explained above (§VII.A.2.e), the starting position for the Yeung-Ruiz combination is at the away position of the double flip delimiter motion, where Ruiz discloses that the “user may hold the device in this orientation *for a time period*, which may be as little as a split instant.” Ex-1006, 4:53-63.

193. In determining an appropriate time period for the watch/recorder to remain in the facing away position, a POSITA would have looked to other teachings in Ruiz explaining that incoming movement patterns must be compared against all templates or models to determine which command the movement corresponds to. Ex-1006, 13:1-3. If there are a modest number of templates, such as 30, “the time needed to match the incoming gesture was around 50 ms/per recognition task.” Ex-1006, 13:13-15. Accordingly, a POSITA would have understood that in order to ensure recognition of the time period at the away position of the double flip, the device should remain there for about 50 ms. A POSITA would further understand that 50 ms would be an obvious choice to try given that the entire time window of the double flip movement pattern is 200 ms—significantly less would result in a risk that the position would not register, while longer would take up too much time of the 200 ms window, not allowing the user to successfully complete the gesture a high percentage of the time, which would result in user frustration and potential abandonment of the feature that does not seem to work. Ex-1006, 8:61-67.

- e. **Dependent Claim 6: The method of claim 1, wherein comprising a step of in response to a detection that the orientation of the wristwatch is held within this second range for a defined time, [1] registering that an orientation of the wristwatch is in the final position; [2] wherein said duration between the starting position and the final position is provided by measuring a duration between the starting position and the registering of the final position.**

194. Yeung-Ruiz discloses Claim 6. As discussed with reference to element 1[c.3], regarding detecting the orientation of the wristwatch in the second range, Yeung-Ruiz teaches detecting that the watch/recorder is in a second range or final position, as shown below.

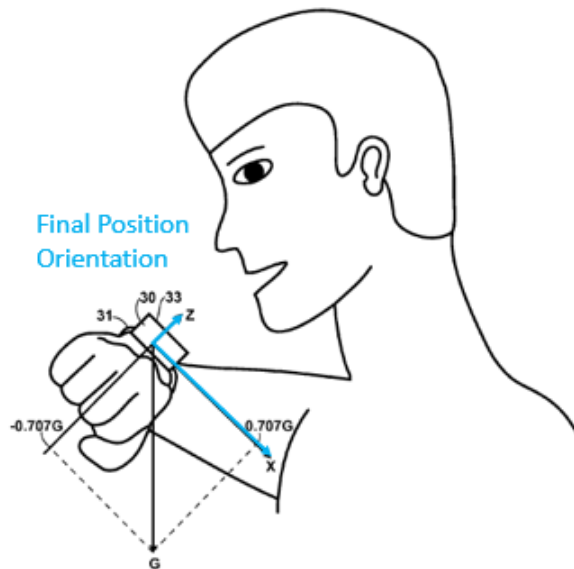
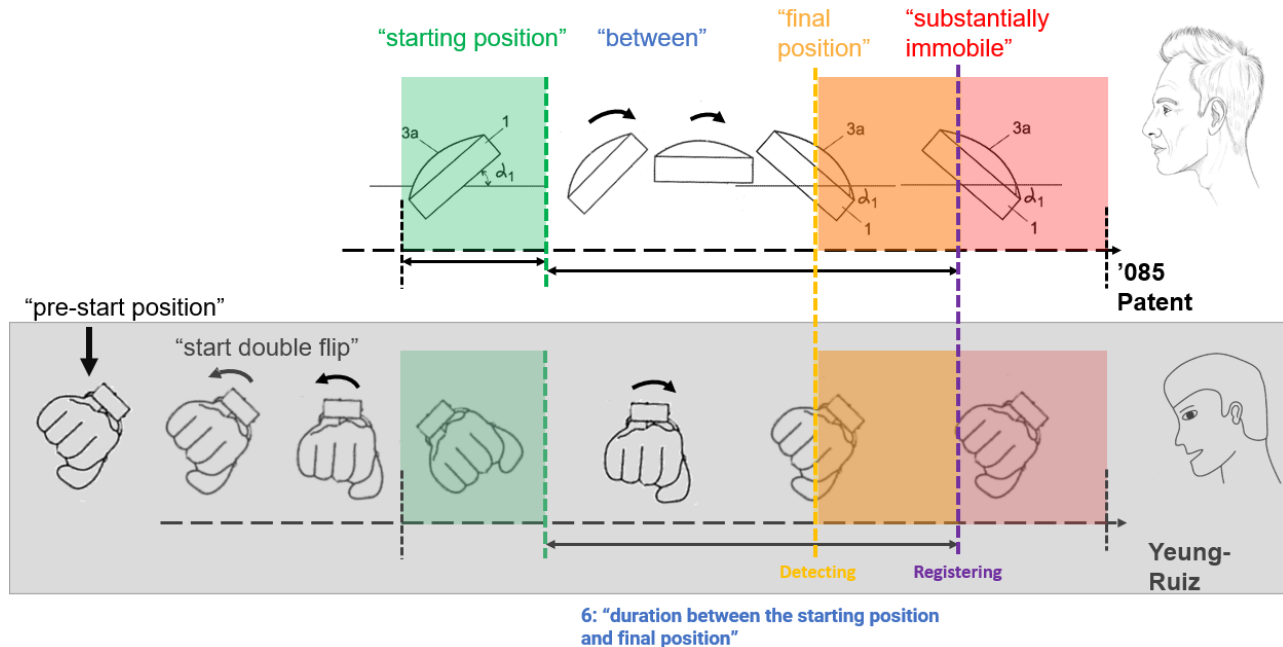


FIG. 6

Ex-1005, Fig. 6

195. Unlike Claim 1, which is agnostic as to the exact point after “detecting” at which the duration between the starting position and ending position is to be

measured, Claim 6 requires “registering” the position after “detecting” the second range and that the “duration between” is to be measured at the “registering” of the position, as shown below.



(Top) Ex-1001, Figs. 7a (left) and 7b/7c (right). The images in the middle, rotation arrows, and face have been added to illustrate the timing and orientation requirements for Claim 1’s wristturn.

(Bottom) Illustration based on Ex-1005, Fig. 6 showing the implementation of Ruiz’s “double flip” in the context of the Yeung-Ruiz combination.

196. A POSITA would have understood that it would take a certain period of time after the device is detected in a particular orientation for signal to be processed and the position to be registered. Specifically, Yeung teaches that after the “analog signal components of the accelerometer” are selected by a multiplexer and converted to “digital datum,” that information is sent to the recorder controller, “which stores the digital datum in an accelerometer-data memory.” *Id.* ¶40. A

POSITA would have understood this storing to be a part of “registering.” This is consistent with the ’085 Patent which discusses “registering” a position and later checking to see if a certain position “was registered” during a previous step. Having a known (i.e., “registered”) position that was stored to compare against would have been the common way a POSITA would have recorded an important characteristic such as a specific position to know when that position had been reached again in the future. Ex-1001, 10:9-15; *see also id.*, 9:61-10:3 (“The fact that a valid start position has been reached is then registered, for example in the accelerometer.”). Registering the position would be a natural way for a POSITA to implement the disclosure of Yeung to have a baseline from which to determine if the device had deviated from that position such that the voice recorder should be deactivated. *See* Ex-1005 ¶45.

197. A POSITA would have understood that the 200 ms double flip taught by Yeung-Ruiz would include the time to complete the gesture, detect the completion, and register the completion, or at least that this was one of a finite number of options for timing the double flip and would be obvious to try. Because Ruiz requires the double-flip gesture be completed within 200 ms (Ex-1006, 8:61-65), it would have been obvious to a POSITA that Ruiz includes a mechanism for measuring the durations between different orientations.

198. As described above in the technology background, timers were a well-known way for implementing duration requirements in a gesture recognition context.

For example, Sachs discloses embodiments where each feature recognition block includes its own timer. *See, e.g.*, Ex-1033¶¶126-128, Fig. 17. Indeed, timers would have been a natural way for a POSITA to implement Ruiz's 200 ms disclosure because timers do not generally require additional hardware and would have been simple for a POSITA to implement. Java, which was mentioned in Ruiz (as well as all platforms that I am aware of from that time period), included support for software timers. Specifically, Java version 1.3 which was released on May 8, 2000, included a Timer class that I used myself in that period that would have been suitable for implementing the timing requirements for Ruiz's gestures. *See* Ex-1055. Documentation of the Timer class shows that it was available since Java version 1.3. *See* <https://docs.oracle.com/javase/1.3/docs/api/>

Overview	Package	Class	Use	Tree	Deprecated	Index	Help	<i>Java™ 2 Platform</i>
PREV CLASS	NEXT CLASS							<i>Std. Ed. v1.3.1</i>
SUMMARY: INNER FIELD CONSTR METHOD				FRAMES: NO FRAMES				
				DETAIL: FIELD CONSTR METHOD				

java.util

Class Timer

[java.lang.Object](#)

+--[java.util.Timer](#)

public class **Timer**
extends [Object](#)

A facility for threads to schedule tasks for future execution in a background thread. Tasks may be scheduled for one-time execution, or for repeated execution at regular intervals.

Corresponding to each `Timer` object is a single background thread that is used to execute all of the timer's tasks, sequentially. Timer tasks should complete quickly. If a timer task takes excessive time to complete, it "hogs" the timer's task execution thread. This can, in turn, delay the execution of subsequent tasks, which may "bunch up" and execute in rapid succession when (and if) the offending task finally completes.

After the last live reference to a `Timer` object goes away *and* all outstanding tasks have completed execution, the timer's task execution thread terminates gracefully (and becomes subject to garbage collection). However, this can take arbitrarily long to occur. By default, the task execution thread does not run as a *daemon thread*, so it is capable of keeping an application from terminating. If a caller wants to terminate a timer's task execution thread rapidly, the caller should invoke the timer's `cancel` method.

If the timer's task execution thread terminates unexpectedly, for example, because its `stop` method is invoked, any further attempt to schedule a task on the timer will result in an `IllegalStateException`, as if the timer's `cancel` method had been invoked.

This class is thread-safe: multiple threads can share a single `Timer` object without the need for external synchronization.

This class does *not* offer real-time guarantees: it schedules tasks using the `Object.wait(long)` method.

Implementation note: This class scales to large numbers of concurrently scheduled tasks (thousands should present no problem). Internally, it uses a binary heap to represent its task queue, so the cost to schedule a task is $O(\log n)$, where n is the number of concurrently scheduled tasks.

Since:

1.3

See Also:

[TimerTask](#), [Object.wait\(long\)](#).

199. As discussed with reference to element 1[c.3], regarding detecting the orientation of the wristwatch in the second range, it would have been obvious to combine Yeung and Ruiz to apply Ruiz's teaching of applying a minimum time duration to the required movement pattern disclosed by Yeung-Ruiz.

f. Dependent Claim 7: The method of claim 6, wherein said defined time is 50 ms.

200. Yeung-Ruiz renders obvious Claim 7. The “defined time” in Claim 7 is the time between detecting the device is in the final position and registering that the device is in the final position, as required by Claim 6. As explained above, (§VIII.A.1.f), the final position for the Yeung-Ruiz combination is at the facing towards portion of the double flip delimiter motion, as shown below.

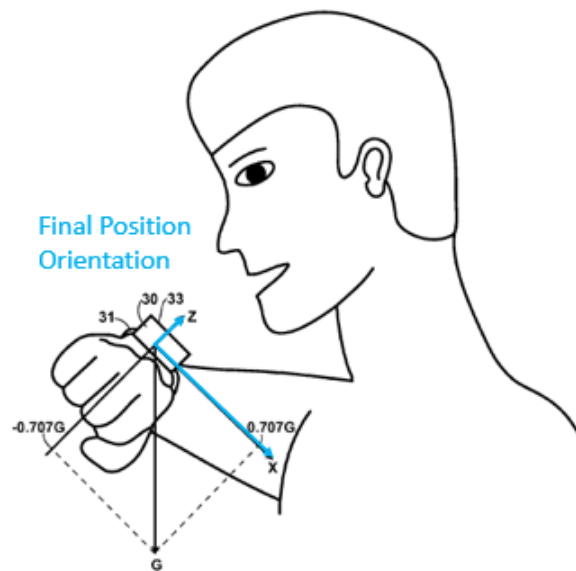


FIG. 6

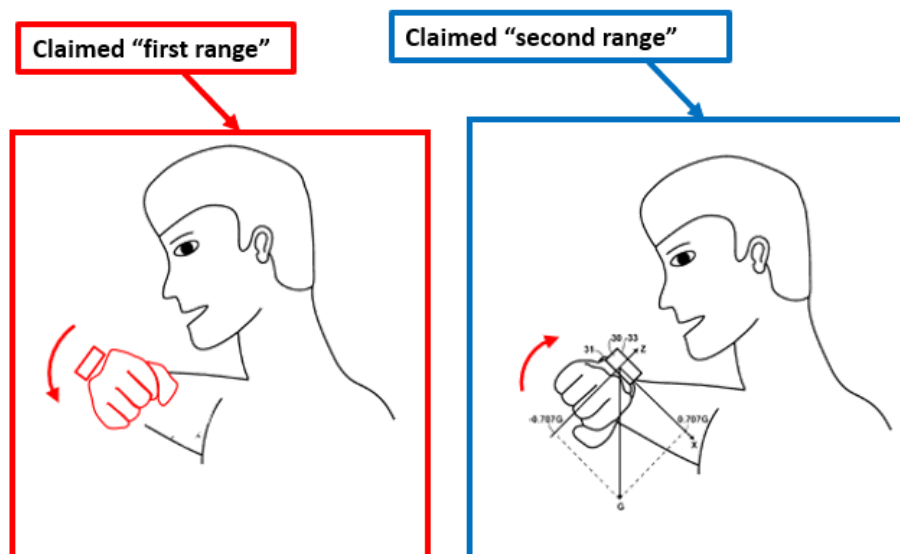
Ex-1005, Fig. 6

201. As described in connection with Claim 6 (§VIII.A.3.e), Ruiz discloses a 50 ms time period for recognizing a gesture and it would have been obvious to a POSITA that this position would have been held for a certain period of time to allow the device to register the final position. And as described with respect to Claim 5 (§VIII.A.3.d), a POSITA would have understood that to ensure recognition of the

time period at the top of the double flip, the device should remain there for about 50 ms or at least that 50 ms would have been obvious to try in the context of Yeung-Ruiz. See Ex-1006, 13:13-15 (“the time needed to match the incoming gesture was *around 50 ms/per recognition task.*”).

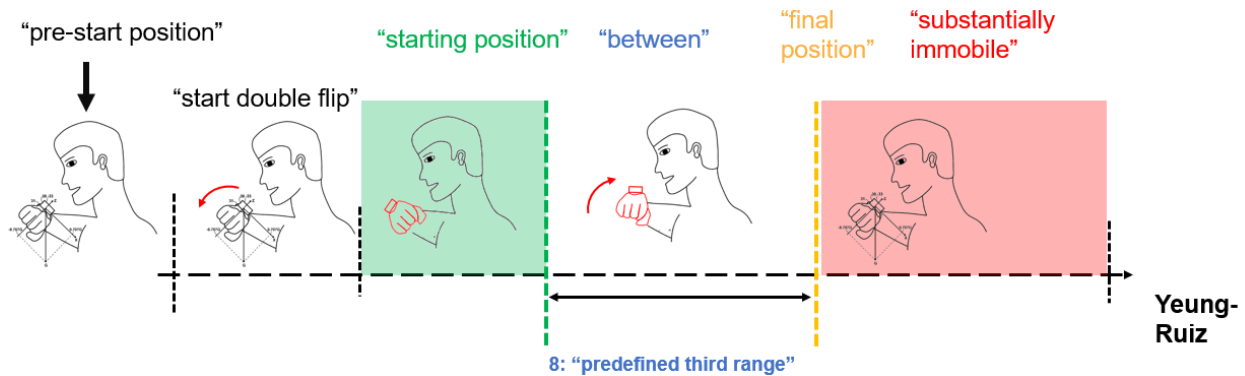
- g. **Dependent Claim 8: The method of claim 1, wherein said step of detecting that the orientation of the wristwatch is in a second range comprises: detecting that a duration between the wristwatch being held in the first range and the wristwatch being held in the second range is in a predefined third range.**

202. Yeung-Ruiz renders obvious Claim 8. As discussed with reference to Claim 1 (§§VIII.A.2.e-f), Yeung-Ruiz discloses the watch/recorder being held in a “first range” (facing away) and then being held in a “second range” (facing towards), as shown below.



Ex-1005, Fig. 6 (left side has been modified to show the watch position at the away position of the double flip)

203. A POSITA would have understood that the duration between the watch/recorder being held in the first range and the watch/recorder being held in the second range would have a particular duration corresponding to the “predefined third range,” as shown in the illustration below.



(Bottom) Illustration based on Ex-1005, Fig. 6 showing the implementation of Ruiz’s “double flip” in the context of the Yeung-Ruiz combination.

204. A POSITA would have measured this range starting after the device was “held” in the starting position and ending when it was detected (and before being “held”) in the final position. Because the double flip motion has a particular time period, it would have been obvious to a POSITA to require the portion of the double flip between being held in the starting position and final position to also have a particular time period corresponding to the “predefined range.”

- h. Dependent Claim 9: The method of claim 1, wherein said step of detecting that the orientation of the wristwatch is then in a second range comprises detecting that a display of the wristwatch is oriented towards a face of the user**

205. Yeung-Ruiz discloses Claim 9. As discussed above with reference to Element 1[c.2], Yeung discloses that the “second range” is when the orientation of the watch/recorder when the recording function is triggered is such that it is oriented towards the mouth of the user, as shown in Figure 6:

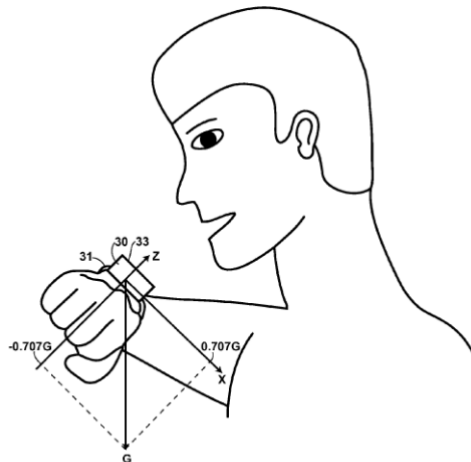


FIG. 6

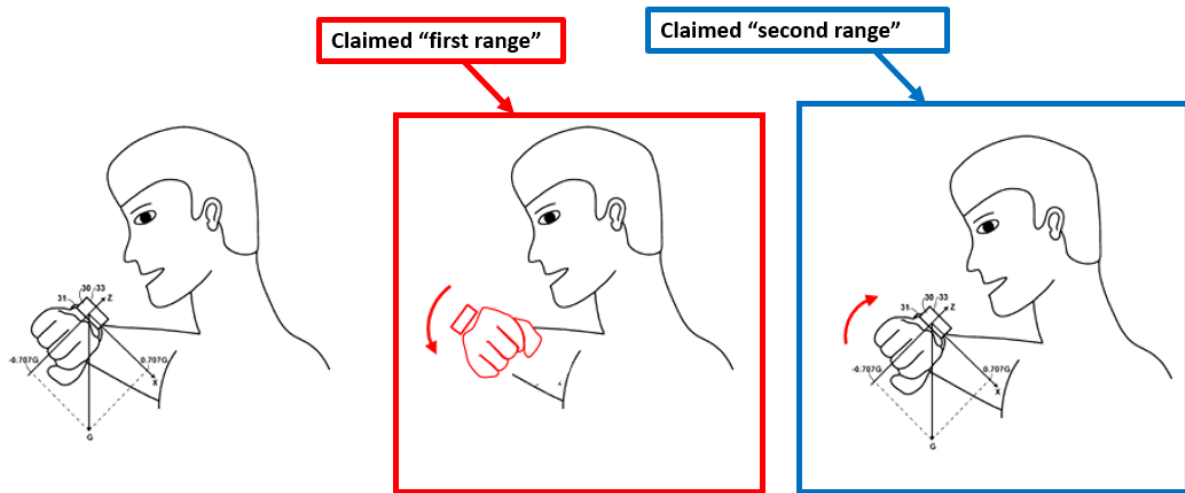
Ex-1005, Fig. 6

206. Yeung explains that Figure 6 depicts a user with the watch/recorder in the recording position “in front of his or her mouth...with the front surface of housing 33 of audio recorder 30 facing the mouth” or in other words with the watch/recorder oriented towards a face of the user Ex-1005, ¶47. “Detecting” whether the watch/recorder is oriented in such a fashion, as required by is part of

detecting whether it is in the “second orientation” where the audio recorder turns on because Yeung explains that Figure 6 is one example of “a predetermined orientation” in which the audio recorder “turns on automatically.” Ex-1005, ¶48. In addition, Yeung discloses that “audio recorder 30 can be designed to take the user’s position or posture into consideration, so that it activates audio recordings” when the audio recorder is oriented in the “natural recording orientation in front of the mouth (as shown in FIG. 6) for a range of user postures.” Ex-1005, ¶48.

- i. **Dependent Claim 10: The method of claim 1, wherein said steps of detecting that the orientation of the wristwatch is in a first range and then in a second range comprise: in response of a detection of the orientation of the wristwatch is in the second range, checking if the orientation of the wristwatch was in the first range during a previous step.**

207. Yeung-Ruiz discloses or renders obvious Claim 10. As described in Elements 1[c.1] and 1[c.2], Yeung-Ruiz discloses detecting the orientation of the watch/recorder in a first range (oriented away from the user) and then a second range (oriented towards the user) as shown below. *Supra* §VIII.A.2.e-f



Ex-1005, Fig. 6 (left and right images). The middle image and arrows have been added to illustrate the wristturn of Yeung-Ruiz.

208. Yeung-Ruiz further teaches that when the orientation is in the second range, checking previously stored orientation data to determine if the watch/recorder was in the first range during a previous step. For example, Ruiz discloses using the double flip delimiter to trigger its system to analyze previous motion data for possible gesture input: “[M]otion--based data may be cached across a trailing window of time on a device, and if a delimiter input is received within a predetermined time period of such input (e.g., 200 ms), *the data in the cache may be processed* to determine what additional motion-based input the user of the device would like to perform.” Ex-1006, 8:61-67. Ruiz further explains that this processing means that “the cache may be checked to determine if the data in the cache matches any motion-based input” and, if so, is “provided to an application as an input.” Ex-1006, 9:2-6.

209. In the context of Yeung's turning an audio recorder on in response to a predetermined movement, a POSITA would have understood that this cache of data collected during the "trailing window of time" would include the motion data showing when the watch/recorder was oriented in the start position. It would have been obvious to use this collected motion data to validate the gesture by "checking if the orientation of the watch/recorder was in the first range during a previous step" in order to reduce the rate of false positive triggers into the higher power mode since that was the whole point of caching the trailing window of motion-based data. As Ruiz explains, the "when a delimiter input is received, the cache may be checked to determine if the data in the cache matches any motion-based input." *Id.* 9:1-6.

B. Ground 2: Claims 1-4, 5, and 8-10 are obvious over Yeung in view of Alameh and further in view of Joselli.

1. A POSITA would have been motivated to combine Yeung's teachings with Alameh's and Joselli's teachings and would have had a reasonable expectation of success

210. A POSITA would have been motivated to combine the teachings of Yeung, Alameh, and Joselli and would have had a reasonable expectation of success in doing so, because all three relate to interpreting movement patterns based on detected orientation and acceleration data in a handheld or wrist-worn electronic devices. Yeung, Alameh, and Joselli provide compatible solutions for detecting when a user is providing an intentional movement pattern that should trigger a response, such as switching power modes or activating functionality in an electronic

device. Compare Ex-1005, ¶¶15, 46-48 with Ex-1007, Abstract, ¶¶5, 17, 28, 31-33 and Ex-1009, 143-144. For example, Yeung provides various embodiments for detecting when a watch/recorder has gone through a particular movement sequence and arrived at a final predetermined orientation where it remains for a period of time and only activating the voice recorder after those criteria have been met. Ex-1005 ¶¶46-48. In Figure 6 Yeung discloses a particular orientation in which the user is likely to desire that the watch/recorder is powered on:

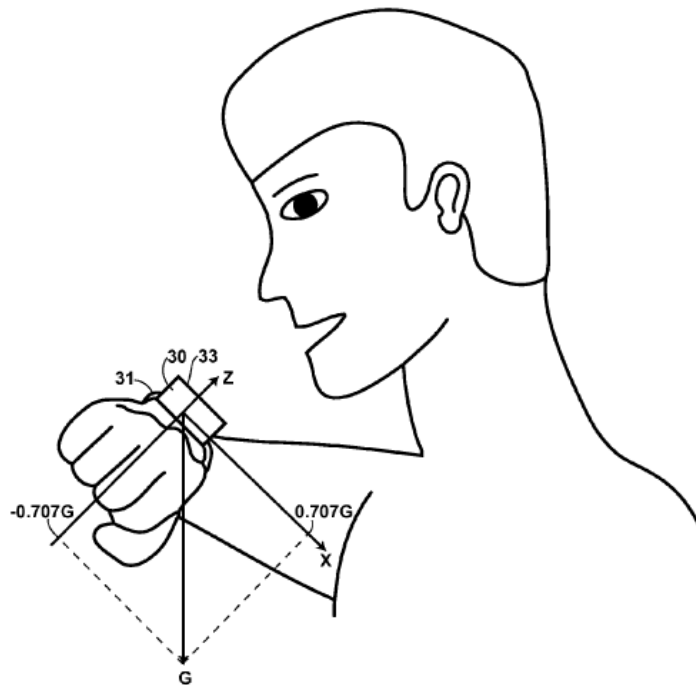


FIG. 6

211. Yeung acknowledges that one potential problem with such a device is activating the recording function accidentally, which may result in unwanted recordings or unneeded mode switches. See Ex-1005 ¶¶48, 52. Yeung addresses

this problem in some embodiments by first detecting a “predetermined movement” that includes first “lifting the arm upwards from a resting position” and then “tilting the wrist toward the mouth.” *Id.* ¶47. Yeung also discloses activating the recorder function (i.e., entering the higher power mode) “only after audio recorder 30 remains in a static position for a predetermined period of time after a predetermined wrist and arm movement pattern has been detected.” *Id.* ¶52. In other words, Yeung first requires a specific gesture—lifting the arm, then rotating the wrist—and then requires holding the device static in the final position for a specific time duration before switching to a higher power mode.

212. Alameh similarly teaches identifying specific movement patterns “to initiate a command.” Ex-1007, ¶31. In particular, Alameh teaches that the mobile device is readied for detecting movement corresponding to a command by being “placed in a substantially motionless orientation for a preset amount of time,” which “serves as a cue to the mobile device that the mobile device is potentially about to be moved in a manner that signifies that a command selection is forthcoming.” Ex-1007, ¶¶31-32. If motion is detected after this period of motionlessness, “the processor 204 uses the accelerometer 104 to track the motion of the mobile device 102 during movement.” Ex-1007, ¶32. Alameh discloses that the “motion is tracked until the mobile device becomes relatively stationary” at which point the “processor 204 compares the tracked movement to a list of numerous predefined/pre-stored

motions” and “marks the particular command” identified as corresponding to the tracked movement. Ex-1007, ¶¶32-33. Figure 6 below illustrates this sequence of steps for identifying and executing a command based on the movement sensed by the accelerometer.

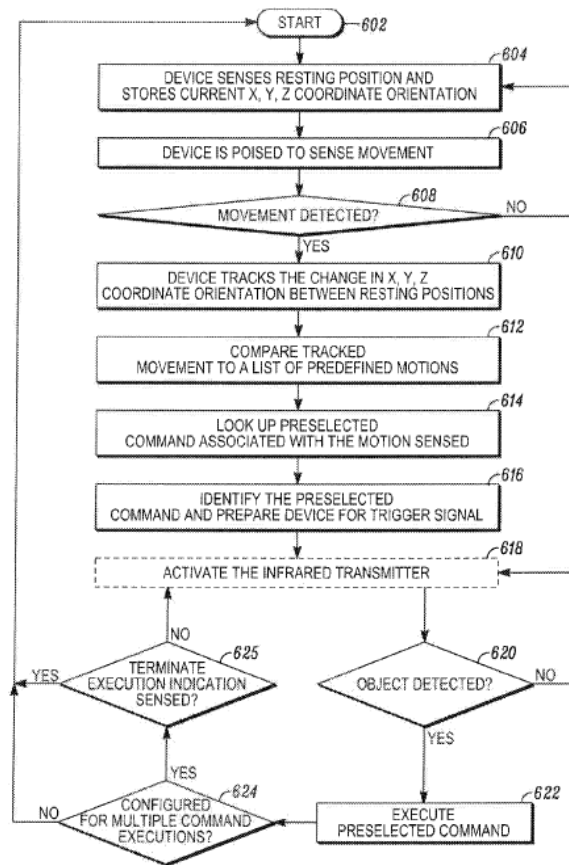


FIG. 6

213. Likewise, Joselli addresses the issue of “segmentation” which is used to automatically determine “the begin[ning] and end[ing] of a gesture.” *Id.*, 144. Joselli explains that “[i]n order to correct[ly] segment an accelerometer gesture, a

definition of this kind of gesture is needed.” *Id.* Joselli explains that “[n]ormally a gesture[] begins with a fast acceleration, a continuous direction change during the gesture, and it ends with a stop of the movement.” *Id.* Moreover Joselli observes that “a good gesture needs a duration of more than 0.6 seconds and less than 2 seconds.” *Id.*

214. A POSITA seeking to minimize false positives so as to avoid unwanted lighting and unnecessary power consumption would have known of and consulted all of these proposed solutions. For example, as described above, identifying a gesture based on particular time spent in a particular orientation was well known in the prior art as a way to improve accuracy and limit unnecessary mode switches. *See supra* §§V.C-D. It would have been obvious to a POSITA to apply these teachings of Alameh and Joselli to Yeung’s method of activating a watch/recorder to reduce the likelihood of inadvertent mode switches.

215. For example, Alameh’s detection of “relative motionlessness of the mobile device” serving “as a cue to the mobile device that the mobile device is potentially about to be moved in a manner that signifies that a command selection is forthcoming” could be applied to Yeung’s disclosure of detecting a predetermined movement, such as the natural movement of lifting the arm upwards from a resting position (i.e., from the side of the body or from in front of the lower end of the torso)

and tilting the watch towards the mouth to activate audio recording.” Ex-1005 ¶47; Ex-1007 ¶¶31-32.

216. Similarly, a POSITA would have been motivated to apply Joselli’s teaching that “a good gesture needs a duration of more than 0.6 seconds and less than 2 seconds” by requiring that the movement pattern in Yeung, from resting position to the final orientation where the recorder functionality turns on, took place in a defined period of time, such as 0.6 to 2 seconds. Ex-1009, 144. It would have been obvious to a POSITA to make this change because a POSITA would have understood that a movement that is too fast is likely not intentional, for example covering one’s mouth in anticipation of a sneeze. Similarly, a movement too slow is also unlikely to signify a user’s intent to activate the recording functionality. For example, if a user raised their wrist from Yeung’s resting position to the final position over the course of an hour, a POSITA would have understood that this movement should not constitute the predetermined movement and would design the system so that the recorder functionality did not activate in this type of scenario. Based on Joselli, a POSITA would be motivated to measure the time between the starting position and final position and constrain the movement pattern to a particular defined window of time.

217. In other words, the combination would utilize the predefined movement already described by Yeung but impose relative motionlessness for a certain period

of time at the beginning of the movement pattern (as taught in Alameh at Ex-1007, ¶¶31-32) and a particular range of times in which the user was to complete the movement pattern (as taught in Joselli at Ex-1009, 144). Doing so would be advantageous because it would reduce the number of false switches to the higher power mode in which Yeung's voice recorder is activated. Thus, a POSITA would have been motivated to improve Yeung's watch/recorder by modifying its algorithm for changing power modes by applying Alameh's minimum time duration requirement and Joselli's range of times in which the gesture must be completed.

218. A POSITA would have had a reasonable expectation of success in combining these teachings of Joselli, Alameh, and Yeung because each purports to solve the problem of identifying movement patterns and using them to activate certain device functionality in similar and predictable ways, namely, by requiring the device to be oriented within particular angle ranges for particular time durations before effectuating a mode change and using similar sensors to detect the orientation of the device. Ex-1005 ¶¶17, 46-48, 52 *with* Ex-1007, Abstract, ¶¶17, 28, 31-33 *and* Ex-1009, 143-144. A POSITA would have understood that they could have combined these teachings with no change in their respective functions because they teach compatible systems. *Id.*

2. **Claim 1**

- a. **Element 1[pre]: A method for switching a wristwatch from a first power mode to a second power mode, comprising:**

219. Yeung discloses the preamble, to the extent it is limiting for the same reasons described with reference to Ground 1. *See supra* §VIII.A.1.a.

- b. **Element 1[a]: using an accelerometer for detecting a wristturn, and**

220. Yeung teaches or discloses Element 1[a]. As described with reference to claim 1, Yeung’s watch/recorder includes an accelerometer. *See supra* §III.A.1.b. Yeung discloses that one movement detected using the accelerometer comprises a wrist-turn: “the natural movement of lifting the arm upwards from a resting position (i.e., from the side of the body or from in front of the lower end of the torso) and tilting the wrist toward the mouth to activate audio recording.” Ex-1005 ¶47. In other words, a “wristturn” is detected, in part, by using an accelerometer to detect the arm lifting from the user’s side and then the wrist rotating to tilt the device toward the user’s mouth.

- c. **Element 1[b]: switching said wristwatch from said first power mode to said second power mode when a wristturn has been detected,**

221. Yeung discloses element 1[b] for the same reasons described with reference to Ground 1. *See supra* §III.A.1.c. As described with reference to element 1[a], in the context of the Yeung the power mode switch would occur after the

predetermined movement of the user raising their arm from the resting position and rotating the screen of the watch/recorder to face the user, which involves a wristturn.

See supra §III.A.1.b.

d. Element 1[c]: wherein said step of detecting a wristturn comprises:

222. Yeung teaches or discloses Element 1[c], as shown below, by detecting a wristturn based on the steps of Elements 1[c.1] – 1[c.3].

e. Element 1[c.1]: detecting that an orientation of the wristwatch is in a starting position, wherein said step of detecting that the orientation is in the starting position comprises detecting that the orientation of the wristwatch is held within a first range for a defined time;

223. Yeung combined with Alameh teaches or discloses Element 1[c.1]. Yeung's accelerometer determines when the accelerometer is at rest in a particular starting position. Ex-1005 ¶39. One particular movement Yeung discloses for activating the recording function is detecting "a predetermined movement, such as the natural movement of lifting the arm upwards *from a resting position* (i.e., from the side of the body or from in front of the lower end of the torso) and tilting the wrist towards the mouth." Ex-1005 ¶47. The claimed "starting position" is the range of angles at which Yeung's watch/recorder is in this "resting position" with the arm at the side of the body or in front of the lower end of the torso.

224. Although Yeung discloses that this is a **resting** position, which a POSITA would understand necessarily requires being held in a particular orientation for some period of time, Yeung does not disclose detecting the period of time in which its device is in the resting position. A POSITA would understand that it does not make any sense to refer to an object as “resting” when referring to a particular instant in time because during any particular instant even an object in motion would appear to be immobile. Thus, a POSITA would understand Yeung’s disclosure to be referring to the absence of movement over some period of time, even if brief. Further a POSITA would have expected the period of time to be perceptible to the user. Thus, although a POSITA may not have contemplated a **maximum** resting time period based on Yeung’s disclosure, they would have expected there to be a **minimum** time in order to trigger the gesture as described in the Technology Background section. See §V.D.

225. Alameh explains that to initiate a command based on a movement pattern (like activating the recording function in Yeung based on a user raising and rotating their arm from the resting position to being positioned in front of the user’s face) “the mobile device 102 is placed in a substantially motionless orientation for a preset amount of time, as detected by a lack of significant acceleration in any direction.” Ex-1007, ¶31. Advantageously, in this motionless position, Alameh discloses that the accelerometer is “able to determine the current coordinates...of

the device and store them in memory,” which a POSITA would understand would make it simple to determine the starting position defined by Yeung. Ex-1007, ¶31. Alameh describes the benefit of detecting the “relative motionlessness of the mobile device” before the command sequence is that it “serves as a cue to the mobile device that the mobile device is potentially about to be moved in a manner that signifies that a command selection is forthcoming.” Ex-1007, ¶32.

226. A POSITA would have been motivated to modify Yeung to include this step of detecting relative motionlessness for a certain period of time at the start of the required movement pattern because it would further Yeung’s aim of avoiding inadvertent activations of the wrist-worn recorder. Ex-1005 ¶52. It would also allow for more reliability in detecting the motion by providing the watch’s processor with a cue that a movement pattern may be forthcoming. Ex-1007, ¶32. Indeed, several references discussed in my technological background section include the need for gesture delimiters including these types of dwell times before initiating a movement pattern. *See supra* §§V.C-D. Thus element 1[c.1] is taught by Yeung combined with Alameh.

- f. **Element 1[c.2]: detecting that an orientation of the wristwatch is then in a final position, wherein said step of detecting that the orientation is in the final position comprises detecting that the orientation is in a second range different from said first range,**

227. Yeung teaches or discloses Element 1[c.2]. Yeung discloses activating the recorder when the orientation of the device is in a final orientation with the watch/recorder raised towards the user's head and oriented towards the user's face, as shown in Figure 6. For example, "the audio recording function of audio recorder 30 turns on automatically when the user positions audio recorder 30 ***in a predetermined orientation, such as the natural orientation for recording shown in FIG. 6***, and/or after audio recorder 30 has completed a predetermined movement."

Ex-1005 ¶48; *see also id.*, ¶¶15, 47.

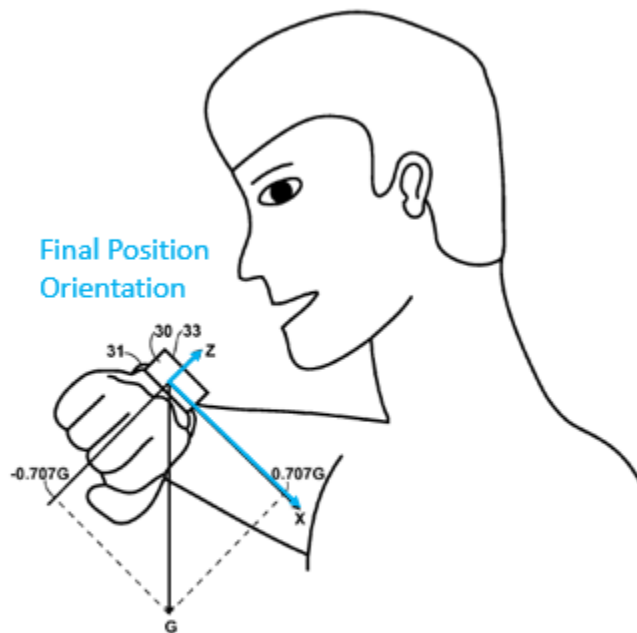


FIG. 6

228. The range of angles when the watch/recorder is oriented towards the face in the final position is different than orientation during the starting “resting position,” which Yeung describes as being with the wrist resting “on the side of the body” or “in front of the lower end of the torso.” Ex-1005 ¶47. For example, the angle shown above is approximately -45 degrees from the horizontal, whereas when a watch is resting at a user’s side it is typically oriented at approximately 90 degrees from the horizontal, as illustrated below.



229. Moreover, Yeung discloses that the watch/recorder detects these different orientations by turning on “when the user positions the audio recorder 30 in a predetermined orientation” and by deactivating the audio recording “as soon as the user moves audio recorder 30 away from the predetermined orientation.” Ex-1005 ¶48. It would have been obvious to a POSITA to define the “predetermined orientation” by a range of orientation angles since requiring a single precise angle

would lead to a frustrating user experience if the recorder continually shut off while still oriented toward the user's face in a natural way based on a slight angle deviation. In my experience, all gesture recognizers allow for human input within a range since it is unrealistic to expect that any input will hold a precise value for any non-trivial period of time. As I described in the Technology Background section, gesture detection was well-known to require that an input has not moved more than a predetermined amount in order to register that gesture. *See supra* §§V.C-D.

- g. Element 1[c.3]: in response to a detection that the orientation of the wristwatch is in the second range, detecting that the wristwatch remains substantially immobile during a predetermined duration and that a duration between the starting position and the final position is in a predefined range.**

230. Yeung combined with Joselli teaches Element 1[c.3]. This claim element requires two separate timing requirements—the watch/recorder must remain “substantially immobile” for a certain duration in the final orientation range and the “duration between” the starting and final positions must be in a predefined range.

“substantially immobile”

231. Yeung discloses the first of these limitations for the reasons described in connection with Ground 1. *See supra* §VIII.A.2.g.

“duration between”

232. Yeung does not explicitly disclose that the duration between the starting position and the final position is of a particular duration. However, Yeung discloses a particular movement pattern requiring: first, “lifting the arm upwards from a resting position;” second, “tilting the wrist toward the mouth;” and finally, activating the recorder function (i.e., entering the higher power mode) “only after audio recorder 30 remains in a static position for a predetermined period of time after a predetermined wrist and arm movement pattern has been detected.” Ex-1005 ¶¶47, 52. Joselli explains that in order to determine the beginning and ending of a movement, a definition of the movement, including the duration, is needed. Ex-1008 at 144. Thus, Joselli discloses that “the authors have observed that normally, a good gesture needs a duration of more than 0.6 seconds and less than 2 seconds. *Id.*

233. In applying Joselli’s teachings to Yeung’s wrist raise and twist movement pattern, it would have been obvious to require a predefined range for the time it takes to complete the movement from the starting position (with the watch/recorder resting by the user’s side) to the final position (with the watch/recorder raised to the user’s mouth and facing the user). It would have been obvious to implement a predetermined range, such as 0.6 seconds to 2 seconds, as disclosed by Joselli, such that the watch/recorder analyzed the duration of the

movement in response to being oriented in the final position to verify that the duration between the starting and final positions fell within the predefined range.

234. A POSITA would have been motivated to implement this feature of Joselli in Yeung to further minimize the accidental activations of Yeung's recording device for the reasons described above. *See supra* §§V.C-D, VIII.B.1. Joselli would have been an improvement in this regard by adding another redundancy to the mechanisms already disclosed by Yeung to limit unwanted recordings. For example, Yeung discloses "the audio recording is stopped as soon as the user moves audio recorder 30 away from the predetermined orientation, so that recording of irrelevant audio information is minimized." Ex-1005 ¶48. Similarly, Yeung discloses minimizing "accidental activation of these audio-recorder functions by normal daily activities." Ex-1005 ¶52. Adding Joselli's "duration" requirement would not have been burdensome for a user and would have resulted in a more efficient detection mechanism. In addition to minimizing unwanted recordings, a POSITA would have been motivated to conserve battery life by not activating the recording hardware when it was not needed for the reasons described above in the technology background section. *See supra* §V.B.

235. Thus, Yeung-Alameh-Joselli renders claim 1 obvious.

3. Dependent Claims 2-4, 6, 8-10

- a. Dependent Claim 2: The method of claim 1, wherein said first range is an angle range from 25° to 155° relatively to the horizontal.**

236. Yeung discloses or renders obvious Claim 2. Based on the specification, a POSITA would have understood that 25 degrees to 155 degrees include angles at which the watch/recorder face is oriented away from the user as shown in the figures below based on Figure 7a and as discussed in connection with this claim element for Ground 1. *See supra* §VIII.A.3.a.

237. As explained above with reference to element 1[c.1], Yeung discloses detecting “a predetermined movement, such as the natural movement of lifting the arm upwards ***from a resting position (i.e., from the side of the body or from in front of the lower end of the torso)*** and tilting the wrist towards the mouth.” Ex-1005 ¶47; *supra* §VIII.B.2.e. A POSITA would have understood that when an individual wearing a watch has the arm in a resting position the watch would naturally be oriented faced away from the user at about 90 degrees from the horizontal, as illustrated in the picture below, as described above with reference to element 1[c.2]. *See supra* §VIII.B.2.f. This 90-degree angle is within the required range of 25 degrees to 155 degrees.



238. A POSITA would have understood that the resting positions described by Yeung encompass a range of angles. To the extent that this claim requires not only that the claimed “first range” be within 25 and 155 degrees but instead requires the “first range” be exactly 25 to 155 degrees, it would have been obvious to a POSITA to use 25 to 155 degrees or would have at least been obvious to try. This is because these angles correspond roughly to angles where the watch face is oriented away from the user and thus may be the “resting position” described by Yeung, similar to what was described in Ground 1.

b. Dependent Claim 3: The method of claim 1, wherein said second range is an angle range from -25° to -75° relatively to the horizontal.

239. Yeung discloses or renders obvious Claim 3 for the same reasons as in connection with Ground 1. *See supra* §VIII.A.3.b.

- c. **Dependent Claim 4: The method of claim 1, wherein said step of detecting that the wristwatch remains substantially immobile during a predetermined duration comprises: detecting that an orientation of the wristwatch is held in a range from -25° to -60° relatively to the horizontal during said predetermined duration.**

240. Yeung discloses or renders obvious Claim 4 for the same reasons as in connection with Ground 1. *See supra* §VIII.A.3.c.

- d. **Dependent Claim 6: The method of claim 1, wherein comprising a step of in response to a detection that the orientation of the wristwatch is held within this second range for a defined time, [1]registering that an orientation of the wristwatch is in the final position; [2] wherein said duration between the starting position and the final position is provided by measuring a duration between the starting position and the registering of the final position.**

241. Yeung-Alameh-Joselli discloses or renders obvious Claim 6. A POSITA would have understood that it would take a certain period of time after the device is detected in a particular orientation for the position to be registered. Specifically, Yeung teaches that after the “analog signal components of the accelerometer” are selected by a multiplexer and converted to “digital datum,” that information is sent to the recorder controller, “which stores the digital datum in an accelerometer-data memory.” *Id.* ¶40. A POSITA would have understood this storing to be a part of “registering.” This is consistent with the ’085 Patent which discusses “registering” a position and later checking to see if a certain position “was

registered” during a previous step. Ex-1001, 10:9-15; *see also id.*, 9:61-10:3 (“The fact that a valid start position has been reach is then registered, for example in the accelerometer.”). Registering the position would be a natural way for a POSITA to implement the disclosure of Yeung to have a baseline from which to determine if the device had deviated from that position such that the voice recorder should be deactivated. *See* Ex-1005 ¶45. .

242. A POSITA would have understood that the “duration between the starting position and the final position is provided by measuring a duration between the starting position and the registering of the final position” is simply the time of the raise and rotate operation plus the time taught by Yeung for remaining static and is thus taught by the Yeung-Alameh-Joselli combination. Because Joselli indicates that a gesture should be between 0.6 seconds and 2 seconds (Ex-1008, 144), it would have been obvious to a POSITA that Joselli includes a mechanism for measuring the durations between different orientations. As described above in the technology background, timers were a well-known way for implementing duration requirements in a gesture recognition context. For example, Sachs discloses embodiments where each feature recognition block includes its own timer. *See, e.g.*, Ex-1033¶¶126-128, Fig. 17. Indeed, timers would have been a natural way for a POSITA to implement Joselli’s disclosure because timers do not generally require additional hardware and

would have been simple for a POSITA to implement and would have at least been obvious to try. *See supra* §VIII.A.3.e.

243. As discussed with reference to element 1[c.3] above, it would have been obvious to combine Yeung and Joselli to apply Joselli's teaching of applying a minimum time duration to the required movement pattern disclosed by Yeung.

- e. **Dependent Claim 8: The method of claim 1, wherein said step of detecting that the orientation of the wristwatch is in a second range comprises: detecting that a duration between the wristwatch being held in the first range and the wristwatch being held in the second range is in a predefined third range.**

244. Yeung-Alameh-Joselli renders obvious Claim 8. As discussed with reference to element 1[c.3], Yeung discloses a particular movement pattern requiring lifting the wrist from a starting position, tilting the wrist to a final position, and then entering a higher power mode once the watch/recorder remains in a static position for a certain duration after the required movement has been detected. *See supra* §VIII.B.2.g. Moreover, Joselli teaches applying a particular time to the duration of a gesture (e.g., from when it leaves the starting position to when the gesture is finished), which a POSITA would have understood would improve the problem recognized by Yeung of inadvertent mode switches. *See supra* §§V.D, VIII.B.1.

245. In this context, a POSITA would have understood that the duration between the watch/recorder being held in the first range (corresponding to Yeung's

arm hanging by the user's side) and that the watch/recorder being held in the second range (corresponding to Yeung's final position of -45 degrees toward the user's mouth) would have a particular duration corresponding to the "predefined third range." Namely, that "predefined third range" would be the particular time duration applied to Yeung-Alameh-Joselli operation of "tilting the wrist toward the mouth," as described with reference to element 1[c.3]. Moreover, as described with reference to element 1[c.1], a POSITA would have expected there to be a *minimum* time in order to trigger the gesture as described in the Technology Background section. See §V.D.

246. A POSITA would have been motivated to implement this feature of Joselli in Yeung to further minimize the accidental activations of Yeung's recording device for the reasons described in *supra* §§V.D, VIII.B.1.

- f. Dependent Claim 9: The method of claim 1, wherein said step of detecting that the orientation of the wristwatch is then in a second range comprises detecting that a display of the wristwatch is oriented towards a face of the user**

247. Yeung discloses Claim 9 for the same reasons discussed in connection with Ground 1. See *supra* §VIII.A.3.h.

- g. Dependent Claim 10: The method of claim 1, wherein said steps of detecting that the orientation of the wristwatch is in a first range and then in a second range comprise: in response of a detection of the orientation of the wristwatch is in the second range, checking if the orientation of the wristwatch was in the first range during a previous step.**

248. Yeung discloses or renders obvious Claim 10. Yeung discloses that “the audio recording function of audio recorder 30 turns on automatically” when the user correctly positions the watch/recorder and “*after* audio recorder 30 *has completed a predetermined movement.*” Ex-1005, ¶48. Thus, Yeung requires detecting not only that the watch/recorder is in an orientation corresponding to the “second range,” but also that it has already “completed a predetermined movement.” To determine that “B” has occurred after “A” has been completed, a POSITA would understand that the system must have some way of tracking the state of the system so as to know whether or not “A” had been completed when “B” has been detected. As an example of this kind of very common gesture recognition, we can consider the process of determining whether a click of a mouse button should be counted as a “double-click” based on what had previous happened.. In practice, this is implemented by starting a timer or recording the time of the click whenever a mouse click occurs. Then, the code for responding to a mouse click, checks to see how much time has elapsed since the previous mouse click (using that timing information). If no time has been recorded, then the system knows that this is the

first mouse click. If time has been recorded, then the system determines if that time is small enough and if so counts the present mouse click as a double-click. In this fashion, the processing of one event is based on whether a previous event has completed along with its characteristics. Because Yeung uses accelerometer data to determine position and movement, Ex-1005, ¶¶46-48, detecting that a predetermined movement has been completed amounts to “checking if the orientation of the watch/recorder was in the first range during a previous step.” A POSITA would recognize this as the standard way to process events. Much as how a click is determined whether it should be registered as a double-click, Yeung’s full gesture recognition processing depends on earlier aspects of the gesture. This would have been a natural design choice because it was the common way to recognize multi-part gestures.

C. Ground 3: Claims 5 and 7 are obvious over Yeung-Alameh-Joselli further in view of Yano

1. A POSITA would have been motivated to combine the Yeung-Alameh-Joselli combination with Yano and would have had a reasonable expectation of success

249. A POSITA would have been motivated to combine Yeung-Alameh-Joselli’s teachings with Yano’s teachings and would have had a reasonable expectation of success because they are all from the same field of utilizing accelerometer data to detect movement patterns and using those patterns as inputs to modify the functionality of an electronic device. Yano provides compatible

solutions for detecting and analyzing movement patterns. For example, Yeung, Alameh, and Joselli focus on general device positioning, movement patterns, and orientation using accelerometers while Yano provides additional detail regarding precise techniques for generating reliable data from triaxial accelerometers. *Compare* Ex-1005, ¶¶15, 46-48 and Ex-1006, ¶¶18-20, 47-49 with Ex-1009, 4:1-10, 6:4-67. A POSITA would have realized that the techniques in Yano would have led to more consistent and reliable data and would have been motivated to incorporate them into the Yeung-Alameh-Joselli combination for that reason.

250. As one example, Yeung teaches utilizing an accelerometer to detect a starting orientation, a particular movement pattern, and a final orientation. *See, e.g.*, Ex-1005, ¶¶39, 46-47. But Yeung does not teach precisely how to account for minor deviations in movement at these positions beyond explaining that “if audio recorder 30 does not move too fast over each cycle of the accelerometer-data acquisition, the acquired and stored X, Y, and Z signal data in each cycle are approximately simultaneous. Ex-1005, ¶46. Similarly, Alameh teaches that the device must be “placed in a substantially motionless orientation for a preset amount of time,” which “serves as a cue to the mobile device that the mobile device is potentially about to be moved in a manner that signifies that a command selection is forthcoming” but again does not disclose how to ensure that positions are accurately registered. Ex-1007, ¶¶31-32. Yano, on the other hand, discloses that when a certain orientation is

detected, taking an average value of the acceleration signal over a short period of time:

If the absolute value of the average value AGy exceeds the threshold value a (yes from #602), the pre/post-action feature quantity remover 1322 selects the average value AGy at time Tb **at which a time period S has elapsed** since time Ta at which the absolute value of the average value AGy exceeded the threshold value a. The pre/post-action feature quantity remover 1322 then stores the average value AGy as a first feature quantity average value AGyl (#603). **The time period S is a constant time period, and may be 50 milliseconds, for example.**

251. Ex-1009, 6:21-30. A POSITA would have understood Yano to be teaching that taking an average measurement over a short time period improves accuracy and reduces the chance that the desired orientation was arrived at through inadvertent motion. This is confirmed by the broader understanding of “signal averaging” that a POSITA would have. As explained in a 2010 book focused on signal processing:

How do we determine the typical amount, a valid estimate, or the true value of some measured parameter? In the physical world, it’s not so easy to do because unwanted random disturbances contaminate our measurements. These disturbances are due to both the nature of the variable being measured and the fallibility of our measuring devices. Each time we try to accurately measure some physical quantity, we’ll get a slightly different value. Those unwanted fluctuations in a measured value are called noise, and digital signal processing practitioners have learned to minimize noise **through the process of averaging**. In the literature, **we can see not only how averaging is used to improve measurement accuracy, but that averaging also shows up in signal detection algorithms** as well as in lowpass filter

schemes.

Ex-1056, 2 (emphasis added). A POSITA would know that the same reasons that signal averaging is common practice in digital signal processing application apply to human inputs in gesture recognition – as human inputs in this context are a form of digital signals. It would have been obvious to a POSITA to apply these teachings of Yano to Yeung-Alameh-Joselli's methods of activating a device to ensure the reliability of the data provided by the accelerometer and ultimately to ensure accurate mode switches.

252. A POSITA would have had a reasonable expectation of success in combining these teachings of Yano with Yeung-Alameh-Joselli because each purports to solve these problems in similar and predictable ways, for example, by using well-known implementations and techniques, such as requiring the device to be in certain orientations for certain periods of time before moving on to a subsequent step of movement recognition. Ex-1005, ¶¶46, 52; Ex-1006, ¶¶18-20, 47-49; Ex-1009, 6:4-30. A POSITA would have understood that they could have combined these teachings with no change in the respective functions of Yeung-Alameh-Joselli because they teach compatible systems.

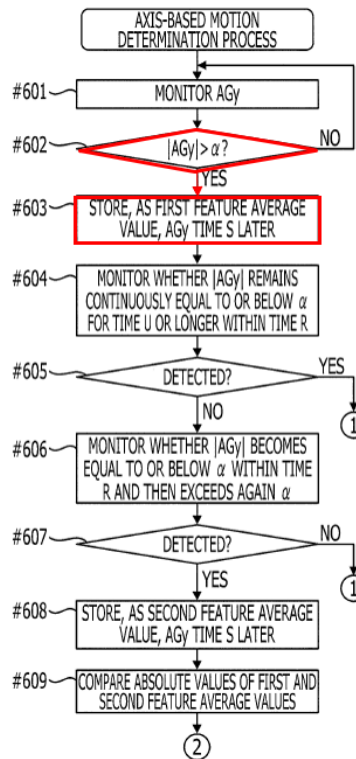
2. Dependent Claims 5 and 7

a. Dependent Claim 5: The method of claim 1, wherein said defined time is 50 ms

Dependent Claim 7: The method of claim 6, wherein said defined time is 50 ms

253. Yeung-Alameh-Joselli-Yano renders obvious Claims 5 and 7. I note that these claims are identical except that Claim 5 appears to refer to a “defined time” with an antecedent basis in Claim 1, while Claim 7 appears to refer to a “defined time” with an antecedent basis in Claim 6. First, Yeung-Alameh-Joselli renders obvious Claims 1 and 6. *See supra* §§VIII.B.2, VIII.B.3.d. Second, Yano discloses that when a certain orientation is detected, taking an average value of the acceleration signal over a short period of time called “S” before moving onto the next step of the detection process, as shown in the flow diagram below. Ex-1009, 6:21-30.

FIG. 6A



254. Yano discloses that the “time period S is a constant time period, and may be 50 milliseconds, for example.” Ex-1009, 6:28-30. Accordingly, a POSITA would have understood that, in view of Yano, it would have been obvious to set the “defined time” in Claim 1 that Yeung’s watch/recorder remained in the starting position at 50 ms and that the same would have been true of the “defined time” between detecting and registering described in Claim 6. A POSITA would have understood that the specific time chosen for any gesture requirement is fairly arbitrary and is a design choice that would depend on a number of factors. For example, a POSITA could have picked a very short time to support a higher degree of efficiency, or a longer time to support a higher degree of accuracy. The time

could be chosen based on market requirements, on user studies for their particular situation, or based on knowledge of prior systems and publications to take advantage of other people's experience such as would be the case if learning from Yano's disclosure. A POSITA would have been motivated to make this combination and had a reasonable expectation of success for the reasons discussed in *supra* §VIII.C.1.

IX. CONCLUSION

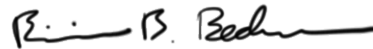
255. For the reasons set forth above, I believe that Claims 1-10 of the '085 Patent is unpatentable in view of the prior art.

256. In signing this declaration, I recognize that it will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place in the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

257. I reserve the right to supplement my opinions in the future to respond to any arguments that the Patent Owner raises and to take into account new information as it becomes available to me.

258. I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Respectfully Submitted

A handwritten signature in black ink, appearing to read "B. B. Bederson", written in a cursive style.

Date: November 2, 2023