

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LENOVO (UNITED STATES) INC.
Petitioner

v.

BLACKBIRD TECH LLC D/B/A BLACKBIRD TECHNOLOGIES
Patent Owner

Patent No. 7,129,931

Inter Partes Review No. _____

**EXPERT DECLARATION
OF
T. KIM PARNELL, PhD, PE
IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 7,129,931**

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EXHIBIT LIST

EXHIBIT	DESCRIPTION
1001	U.S. Patent No. 7,129,931 (“’931 patent”)
1002	Declaration of Dr. T. Kim Parnell (“Decl.”)
1003	Curriculum Vitae of Dr. T. Kim Parnell
1004	Excerpts from File History of U.S. Patent 7,129,931
1005	U.S. Patent No. 5,016,849 (“Wu”)
1006	U.S. Patent No. 5,708,840 (“Kikinis”)
1007	U.S. Patent No. 5,335,142 (“Anderson”)
1008	Certified Translation of Japanese Patent Appl. Publ. No. JP11161367 (“Ioka”)
1009	U.S. Patent No. 5,632,373 (“Kumar”)

I, T. Kim Parnell, PhD, PE, declare as follows:

I. INTRODUCTION

1. I have been asked by the party requesting this review, Lenovo (United States) Inc. (“Lenovo”), to provide my expert opinions in connection with the above-captioned petition for *inter partes* review of U.S. Patent No. 7,129,931 (the “’931 patent”), challenging the patentability of claims 1, 2, 3, 6, 8, 9, and 10 of the ’931 patent.

2. I currently hold the opinions set forth in this declaration.

3. In summary, it is my opinion that the references cited below render obvious claims 1, 2, 3, 6, 8, 9, and 10 of the ’931 patent. My detailed opinions on the claims are set forth below.

II. BACKGROUND AND QUALIFICATIONS

4. In 1978, I received a BES in Engineering Science & Mechanics from the Georgia Institute of Technology (Georgia Tech). In 1979, I received an MSME degree in Mechanical Engineering from Stanford University. In 1984, I received a Ph.D. in Mechanical Engineering also from Stanford University.

5. I am a licensed professional Mechanical Engineer (PE license M25550) in the State of California. I have over 30 years of experience as a professional engineering consultant including 1986-1999 as a Senior Managing Engineer at Exponent and 2000 to Present as Principal & Founder of Parnell

Engineering & Consulting (PEC). My practice encompasses patents, design, failure analysis, and reliability for a variety of industrial, medical, electronic, and consumer products. My professional career started at Bell Telephone Laboratories (Bell Labs) in 1978 where I was involved with the physical design of telephone sets, components, and evaluation of new technology.

6. I have performed inspections and consulted on several types of consumer electronic equipment (computers, cell phones, portable entertainment devices, etc.) during my career. I also have direct experience with manufacturing in multiple industries during my consulting career. These applications include consumer electronics, biomedical, medical device, automotive, petrochemical, paper, metal forming, metalworking, specialty materials and others. Equipment at issue often involves injection molding, metal forming and machining, semiconductor packaging, pipelines and piping components, pressure vessels, sensors and control systems.

7. I am a Fellow of the American Society of Mechanical Engineers (ASME) and a Senior Member of the Institute of Electrical and Electronic Engineers (IEEE). I am also a member of several IEEE Societies including Consumer Electronics (CE), Components, Packaging, and Manufacturing Technology (CPMT), Vehicular Technology Society (VTS), Sensors Council, and the Nanotechnology Council. I was elected as Chair of the IEEE Santa Clara

Valley Section in 2011 (the SCV Section is the largest IEEE Section in the world with over 12,000 members in Silicon Valley). I was elected as Chair of the IEEE Consultants' Network of Silicon Valley (IEEE-CNSV) in 2008-2009 and remain as a Member of the Board of Directors for this organization. I am also a Member of ASM (ASM International), the ASM Electronic Device Failure Analysis Society (EDFAS), the ASM Shape Memory & Superelastic Technology (SMST), and SAE (Society of Automotive Engineers).

8. I was a full-time member of the Mechanical Engineering faculty at Santa Clara University from 2010-2012 and taught classes in Manufacturing, Material Science, Mechanical Design, Finite Element Analysis (FEA), Composite Materials, and Mechanisms. During this time, I served as the Faculty Advisor for several Senior Design Projects. These "real world" Capstone Design Projects encompassed design, system integration, and manufacturing aspects and provided the students with a full product development experience. I also taught graduate courses in Mechanical Engineering at Stanford University from 1995-1996. I have delivered numerous invited presentations, short-courses, and seminars on a range of technical topics to professional organizations. Some topics include Mechanical Design for Reliability (MDfR) courses tailored to specific types of products and industries, and Medical Device Technology. I also taught several courses involving

the application of simulation and analysis tools and how to better utilize simulation in the design cycle to reduce design time and to improve product reliability.

9. A more comprehensive record of my professional background and technical qualifications is reflected in my *curriculum vitae*, which is Exhibit 1003.

III. COMPENSATION

10. My compensation as a consulting expert in this matter is \$450 per hour. My compensation is not contingent on the conclusions I reach in my analysis or the outcome of the *inter partes* review (“IPR”) proceeding.

IV. MATERIALS CONSIDERED

11. To prepare this declaration, I have reviewed and considered the '931 patent (Ex. 1001) and the prosecution history for the '931 patent (Ex. 1004).

12. I have also reviewed and considered the following:

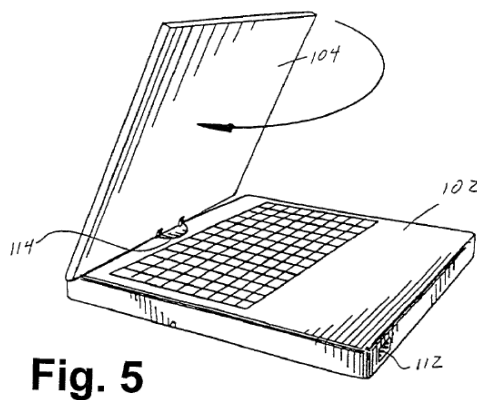
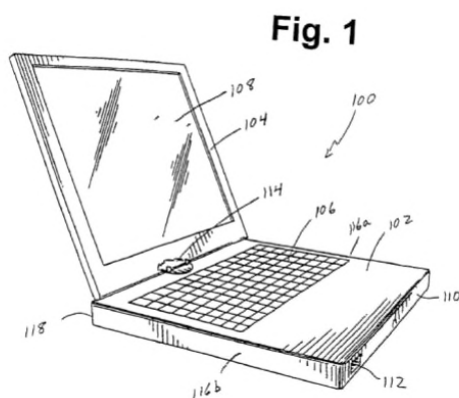
- **U.S. Patent No. 5,016,849 (“Wu”) (Ex. 1005)**, titled “Swivel Mechanism for a Monitor of a Laptop Computer,” was filed on November 17, 1989 and issued on May 21, 1991 to Sunny Wu. (Ex. 1005.) It is my understanding that Wu is prior art under at least 35 U.S.C. § 102(b).
- **U.S. Patent No. 5,708,840 (“Kikinis”) (Ex. 1006)**, titled “Micro Personal Digital Assistant,” issued on January 13, 1994 to Dan Kikinis et al. (Ex. 1006.) It is my understanding that Kikinis is prior art

under at least 35 U.S.C. § 102(b). The application that led to Kikinis was filed on March 4, 1996.

- **U.S. Patent No. 5,335,142 (“Anderson”) (Ex. 1007)**, titled “Portable Computer Display Tilt/Swivel Mechanism,” issued on August 2, 1994 to William J. Anderson. (Ex. 1007.) It is my understanding that Anderson is prior art under at least 35 U.S.C. § 102(b). The application that led to Anderson was filed on December 21, 1992.
- **Japanese Patent Application Publication No. 11-161367 (“Ioka”) (Ex. 1008)**, titled “Portable Information Processor,” published on June 18, 1999 to Ioka Tsunejiro. (Ex. 1008.) It is my understanding that Ioka is prior art under at least 35 U.S.C. § 102(b). The application that led to Ioka was filed on November 27, 1997.
- **U.S. Patent No. 5,632,373 (“Kumar”) (Ex. 1009)**, titled “Protective Case for Portable Computer,” issued on May 27, 1997 to Rajendra Kumar and Steven E. Brooks. (Ex. 1008.) It is my understanding that Kumar is prior art under at least 35 U.S.C. § 102(b). The application that led to Kumar was filed on April 3, 1995.

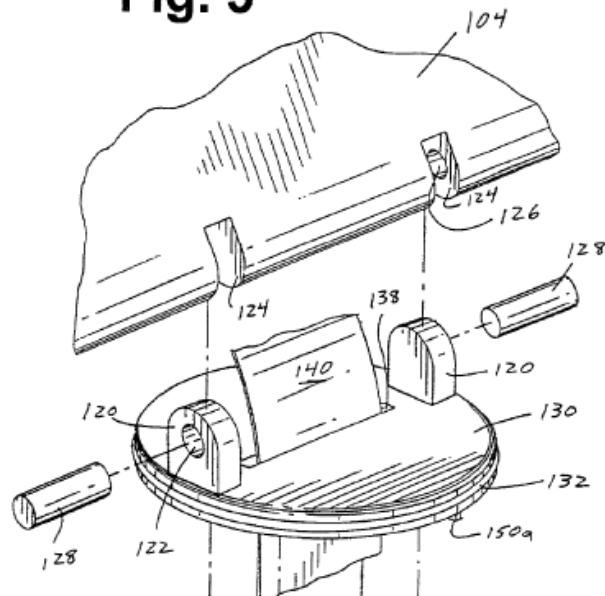
V. THE '931 PATENT

13. The technology of the '931 patent is not sophisticated. This is especially true in view of the state of the art at the time of the invention, which is further explained in Section VI. The '931 patent is directed to a design for a portable computer display system and to provide added convenience in terms of positioning of the display system. A stated objective of the '931 patent invention was to provide a device that “allows a computer user to easily and effectively maximize the value and utility of the laptop’s flat panel display.” (Ex. 1001 at 2:60-63.) The '931 patent provides a rotatable flat panel display that works in combination with the supposed advantageous positioning of a port on the front face of the laptop computer housing. (Ex. 1001 at 3:63-67.) The '931 patent addresses this objective by having the structure identified in Figures 1 and 5—each respectively showing the portable computer, having a port (112), yet depicting the flat panel display in a traditional arrangement (Ex. 1001 at Fig. 1, left) and an alternative position facing away from the user (Ex. 1001 at Fig. 5, right).



14. Figure 3, partially depicted below, is a close up of the mounting assembly (114) that facilitates the dual axis operability of the flat panel display relative to the keyboard base. (Ex. 1001 at Fig. 3, 3:3-13.) The device generally includes a rotating turret (130) that has two vertically extending posts (120). (Ex. 1001 at 7:13-15.) The '931 patent states that “[l]aptops computers generally employ flat-panel monitors for reasons of necessity, given space/weight constraints and the desire to pivotally mount the monitor relative to the base/keyboard for system protection and portability.” (Ex. 1001 at 1:60-63.) The display (104) has two recesses (124) within it that couple to the posts (120), allowing for the opening and closing, or pivoting, of the display onto the keyboard base. (Ex. 1001 at 7:15-17.) The rotating turret is mounted onto the keyboard unit to facilitate rotational movement of the display relative to the keyboard base along a second or vertical axis. (Ex. 1001 at 7:28-39.) The communication conduit (140), shown as a ribbon cable, is disclosed as extending from the keyboard unit (not shown) and into the display (104). (Ex. 1001 at 7:30-36.)

Fig. 3



15. In addition to the mounting assembly described above, the '931 patent places an "input receiver" or "port" on the front part of the laptop computer housing, or close thereto, to "permit efficient and non-encumbered coupling of the laptop computer to an ancillary computer system, *e.g.*, a separate desktop computer and/or a PDA." (Ex. 1001 at 3:50-53.) The '931 patent describes that the port configuration "generally constitutes a 15 pin D-sub video connector, serial port, parallel port and/or universal serial bus ("USB"), and may communicate with peripheral devices by wired communication or wireless communication (*e.g.*, via infrared signals)." (Ex. 1001 at 5:65-6:3.) This port appears to be configured to facilitate the use of the laptop display as an external or secondary monitor for the ancillary computer system.

16. The claims of the '931 patent require a collection of well-known components. The '931 patent includes 17 claims, with 2 independent claims.

Independent claim 1 is representative:

1. A computer system comprising:

[1a] a) a keyboard unit including a computer keyboard and a keyboard base that includes a front wall and a back wall;

[1b] b) a display screen for displaying computer-generated images, said display screen defining first and second side walls, a bottom edge that extends from the first side wall to the second side wall and two spaced slots formed in said bottom edge;

[1c] c) a mounting assembly proximate said back wall of said keyboard base, said mounting assembly including two spaced mounting brackets extending upwardly from a rotatable element and configured and dimensioned to be received within said two spaced slots, said mounting assembly joining said display screen to said keyboard unit and permitting both rotational motion of said display screen relative to a first axis and pivotal motion of said display screen relative to a second axis that is perpendicular to said first axis; and

[1d] d) a port positioned proximate said front wall of said keyboard base, said port adapted to receive a signal from an ancillary computer system;

[1e] wherein a signal from said ancillary computer system delivered to said port is effective to generate a computer-generated image on said display screen; and

[1f] wherein said bottom edge of said display screen defines an intermediate region between said pair of slots and wherein a communication conduit extends from said keyboard base directly into said intermediate region of said display screen.

VI. LEVEL OF ORDINARY SKILL IN THE ART

17. It is my understanding that the '931 patent is to be interpreted based on how it would have been read by a person of ordinary skill in the art ("POSITA") at the time of the invention. I understand that September 14, 2001 is the effective filing date of the patent application that issued as the '931 patent.

18. It is my understanding that factors such as the educational level of the inventor, the educational level of those working in the field, the sophistication of the technology, the types of problems encountered in the art, the prior art solutions to those problems, and the speed at which innovations are made all help to establish the required level of skill in the art.

19. Considering these factors, it is my opinion that a POSITA of the '931 patent technology at the time of the invention would have at least 18 months of hands-on computer physical design work or mentorship from a computer physical designer, and an undergraduate degree in mechanical engineering, manufacturing design, or an equivalent engineering degree.

20. The POSITA at the time of the invention of the '931 patent would be familiar with the physical design of computers and laptop computers as well as consumer electronics devices in general. A POSITA's knowledge of laptops would include, among other things, a familiarity with hinge mechanisms used to connect a base to a display and components found in laptop computers.

21. I utilized my professional and personal experience on the state of the relevant art at the time of the '931 patent invention, and also prior to the invention of the '931 patent.

22. In addition, I am aware of information generally available to, and relied upon, by persons of ordinary skill in the art (POSITA) during the relevant time period. Such information includes familiarity with the wide variety of laptop systems available from the relevant time period. My personal and professional experience comes into play here as I began using personal computers in 1984 beginning with the initial IBM PC and "portable" (luggable!) computers such as the Compaq systems as they became available in the market. I also have direct experience with a wide variety of laptop and handheld computers starting with the first commercial models and coming up to present day systems. Some early examples of relevant laptop computers include those Toshiba models shown below that were available commercially between 1985 to 1996:



23. I am a person of at least ordinary skill in the art with respect to the subject matter of the '931 patent at the time of the effective filing date as detailed in Section II, which discusses my background and experience with the physical design of laptop computers and other relevant devices that utilize similar technology.

24. A POSITA would also have had a basic understanding of personal computer components, hardware, and computer programs. Specifically, a person of ordinary skill in the art would have known that laptop or portable computers have hinge assemblies as part of the housing, processors (CPUs), memory (RAM), storage devices, display screens, keyboards, and ports to interface with peripheral devices. A POSITA could have gained this basic knowledge by using computers on a regular basis, designing computers, or it could also have been obtained by training about computers, service or repair of computers, or through more formal education and training. By September 14, 2001, I had gained this knowledge and familiarity as detailed above in Section II.

VII. OVERVIEW OF THE PRIOR ART

A. U.S. Patent No. 5,016,849 (“Wu”)

25. Both Wu and the '931 patent disclose systems that provide mechanisms for positioning display screens for laptop computers. Wu teaches a

system with a keyboard base and an attached, moveable display screen (*i.e.*, monitor). (Wu at Fig. 2, Abstract.)

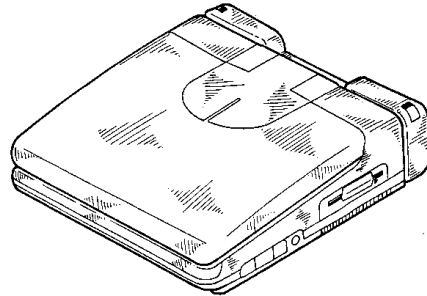


Fig.1

26. Wu describes a laptop computer that includes a base, keyboard, and monitor. The system in Wu allows the screen to rotate/swivel relative to a keyboard around a horizontal and a vertical axle. (Wu at 1:59-63, Fig 2.) The vertical axle includes a fixed seat and a positioning block (as shown in Figs. 2 and 3). (Wu at 1:63-2:7.)

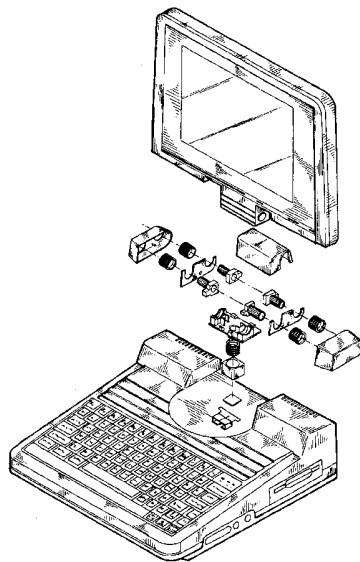


Fig. 2

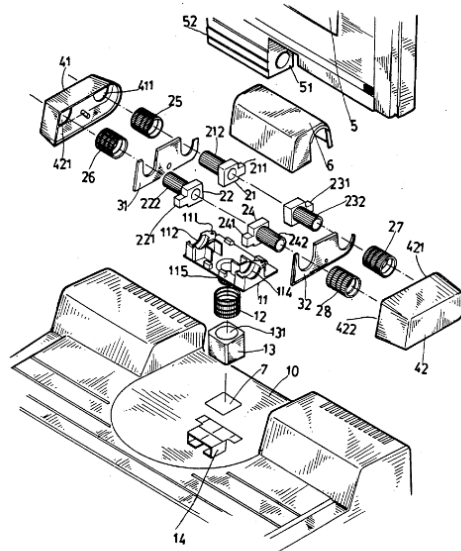


Fig. 3

27. The vertical axle facilitates rotation between the laptop display and the fixed seat that is attached to the laptop base as shown in Fig. 5. (Wu at 2:2-7.)

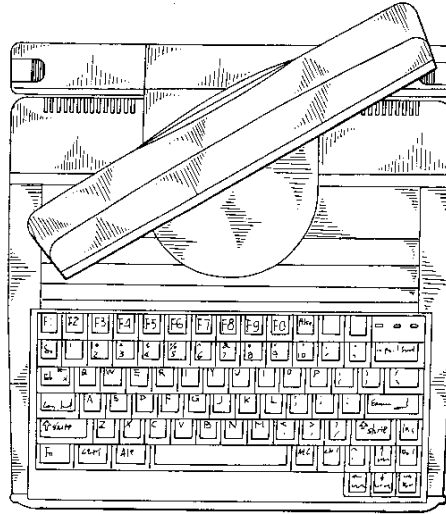


Fig. 5

28. The horizontal axle facilitates rotation between the fixed seat and the display screen. (Wu at 2:10-43.) In this manner, the monitor is able to rotate about the horizontal axle to close over the laptop keyboard and base. (Wu at Fig. 1.)

29. A POSITA would understand that Wu only discusses the hinge mechanism for a laptop computer and that the swivel hinge mechanism of Wu could be used with laptop systems available at the relevant time. Laptop computers at the relevant time were predominately constructed with a base portion (which included the keyboard) and a display cover in a clam-shell arrangement. The display cover and base were attached using a variety of hinge mechanisms and it would have been obvious to a POSITA to use Wu's swivel hinge mechanism with the clam-shell laptop systems available.

B. U.S. Patent No. 5,708,840 (“Kikinis”)

30. Kikinis discloses a personal digital assistant module (or micro PDA) that can form a host/satellite combination with a host computer. (Kikinis at Abstract.) The host can be a general-purpose computer with a connection between the CPU of the host and the CPU of the personal digital assistant where the host “may be a desktop unit, a notebook computer, or a smaller portable.” (Kikinis at 3:33-43.) Kikinis discloses combining the micro PDA with a computer having a keyboard, tiltable screen, and access ports. (Kikinis at Fig. 5 and Fig. 41.)

Figure 5 illustrates a computer 172 connecting with a micro PDA 10.

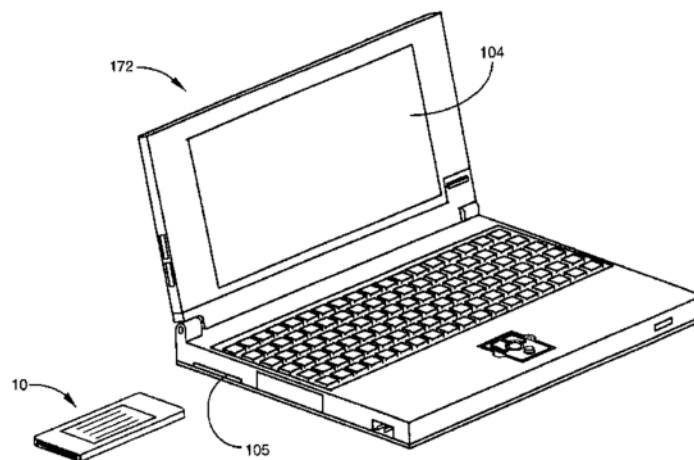


Fig. 5

31. Kikinis discloses another example in Fig. 41 of a host computer using a Personal Computer Memory Card International Associate (PCMCIA) connection to connect to a micro PDA. The laptop disclosed in Fig. 41 includes four PCMCIA

ports, with at least one of them close to the front wall of the laptop keyboard base. (Kikinis at 30:41-43.)

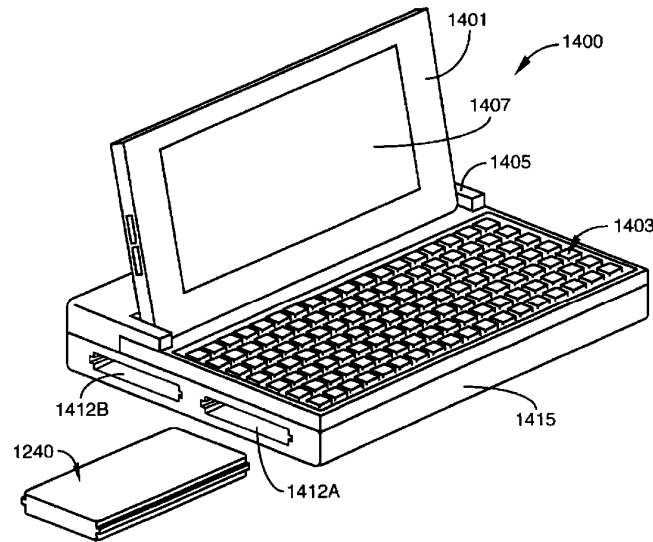


Fig. 41

32. Kikinis discloses function modules that attach to the PCMCIA connection and is able to transfer information to the host device from the inserted device. (Kikinis at 28:56-57.) Kikinis also discloses a variety of different types of function modules, including “specialty video modules.” (Kikinis at 29:4-9.)

C. U.S. Patent No. 5,335,142 (“Anderson”)

33. Like Wu, Anderson discloses a portable computer with a hinge assembly that allows the display screen to be tilted from the base about a horizontal axis and swiveled about a vertical axis. (Anderson at Abstract.) The hinge assembly provides tilt and swivel stops, preventing the screen from tilting more than 115 degrees from the closed position or swiveling more than 30 degrees

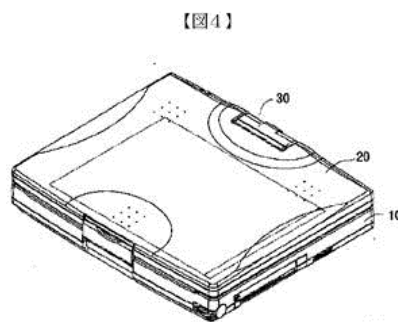


35. Anderson combines a swivel disk 46 with mounting ring 54 to provide swiveling of the display. (Anderson at 4:63-5:2.) The swivel disk fits within a grooved ring and rotates relative to the circular mounting ring attached to the base of the laptop computer. (Anderson at 4:63-5:2.) Within the mounting ring are stops that are labeled as 70. (Anderson at 5:7-18.) Stop tabs 72 are oriented on the swivel disk such that the swivel disk is stopped from rotating beyond a total of 60 degrees. (Anderson at 5:7-18.)

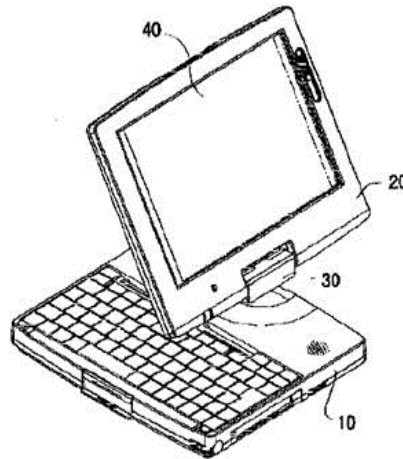
36. Anderson achieves the tilting action by using a tilt-tube 84 extending through tilt base walls and through the pivot arms 88 of the attachment yoke 42. (Anderson at 5:40-45.) The tilt base is attached to the swivel disk. The attachment yoke is attached to the display screen.

D. Japanese Patent Application Publication No. 11-161367 (“Ioka”)

37. Like Wu, Ioka discloses a notebook computer with a display screen that can tilt relative to its base around a horizontal axis and can swivel around a vertical axis. (Ioka at ¶¶ [0005], [0007], [0008], Figs. 4-5.) The screen can be closed like a typical notebook computer with the screen down. (Ioka at Fig. 1.)

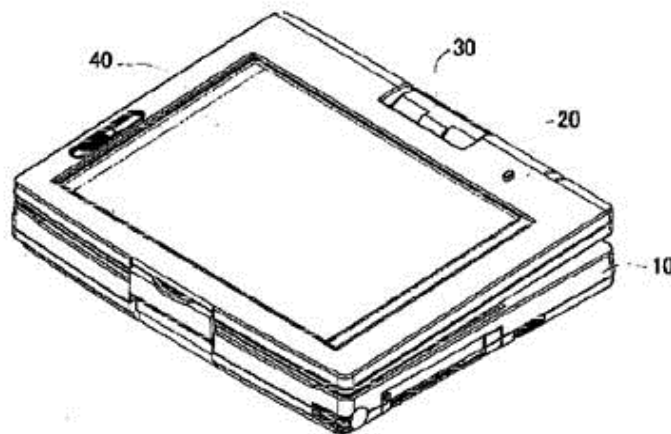


38. When the display screen is raised, a user can swivel the screen around a vertical axis. (Ioka at Fig. 1.)



39. The screen can also be folded down such that the screen is face up. (Ioka at Fig. 5.) Ioka discloses that the display screen that can be rotated around a vertical axis at least 180 degrees and closed again. (Ioka at ¶ [0008].)

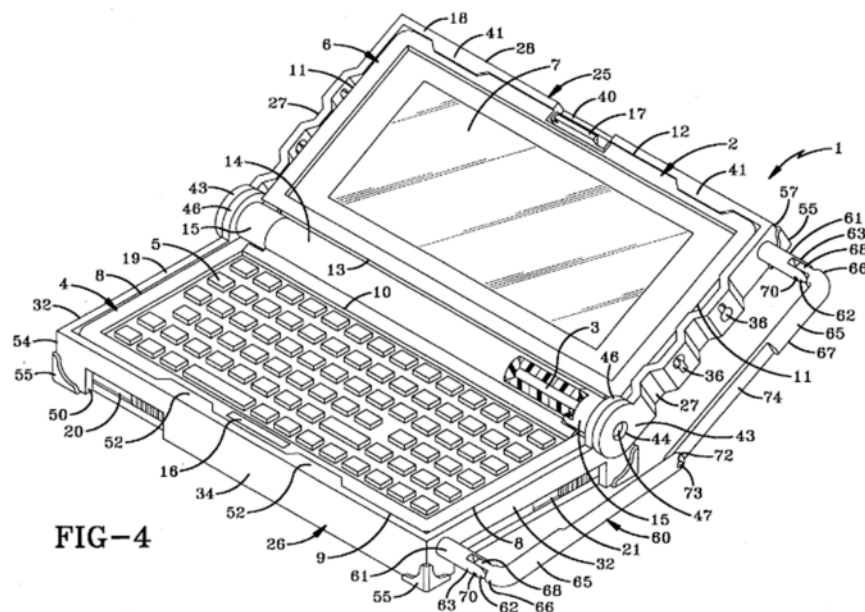
【図5】



E. U.S. Patent No. 5,632,373 (“Kumar”)

40. Kumar discloses a protective case for portable computers. Kumar discusses that portable computers “may be all purpose computing machines capable of running a variety of types of software programs.” (Kumar at 1:20-22.) In addition, “[t]hese portable personal computer may interact with a variety of portable and stationary peripheral input/output devices such as printers, light pens, image scanners, video scanners, etc.” (Kumar at 1:22-25.)

41. Kumar describes a protective case that is adapted to hold a portable computer. (Kumar at 3:60-62.) Kumar describes that the “[p]ortable computer 2 is of the general clam shell type having a base housing 4 with a standard keyboard 5 mounted thereon. A top housing 6 houses a display screen 7, and is pivotally



attached to base housing 4 via a hinge pin 3 and may be moved between a closed position whereby the display screen covers keyboard 5 and an open position (Fig. 4).” (Kumar at 3:64-4:3.) Kumar additionally describes that “portable computer 2 is normally provided with a plurality of input/output ports such as port 20 extending through front wall 9, and port 21 extending through sidewall 8.”, both of which indicate possible locations for various typical laptop ports. (Kumar at 4:21-24.)

VIII. OBVIOUSNESS STANDARDS

42. I have been informed and understand that a patent claim is invalid if it would have been obvious to a POSITA at the time of the claimed invention. I have been further informed and understand that a claimed invention is not patentable if differences between it and the prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the pertinent art at the time the invention was made. I have been informed and understand that factors relevant to the determination of obviousness include the scope and content of the prior art, the level of ordinary skill in the art at the time of the invention, and differences between the claimed invention and the prior art.

43. I have been informed and understand that a prior art reference must be analogous to the claimed invention to be considered in the obviousness analysis. I

understand that a prior art reference is analogous if the art is from the same field of endeavor, regardless of the problem addressed. I also understand that a prior art reference that is not within the field of the inventor's endeavor is analogous if the reference still is reasonably pertinent to the particular problem with which the inventor is involved. A prior art reference is reasonably pertinent if it logically would have commended itself to an inventor's attention in considering his problem.

44. I have been informed and understand that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. I have also been informed and understand that when a patent claim simply arranges old elements with each performing the same function it had been known to perform, and yields no more than one of ordinary skill would expect from such an arrangement, the combination is obvious.

45. I have been further informed and understand that there are several rationales for combining prior art references or modifying prior art references to show obviousness of claimed subject matter. These rationales include: simple substitution of one known element for another to obtain predictable results; use of a known technique to improve similar devices in the same way; applying a known technique to a known device ready for improvement to yield predictable results; choosing from a finite number of identified, predictable solutions with a reasonable

expectation of success; known work in one field of endeavor may prompt variations of it for use in either the same field or a different field based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; and some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill in the art to modify a prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

46. I have been informed and understand that a patent claim composed of several limitations is not obvious merely because each limitation was independently known in the prior art. Hindsight reasoning is not an appropriate basis for combining references to form an obviousness combination. I have been further informed and understand that it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine multiple prior art references.

47. I have been informed and understand that the obviousness analysis requires consideration of common knowledge, common sense, and the perspective of a person of ordinary skill in the art. The Supreme Court of the United States has said that a person of ordinary skill is also a person of ordinary creativity, not an automaton, and that, in many cases, a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle.

IX. THE PRIOR ART RENDERS OBVIOUS CLAIMS 1-3, 6, AND 8-10 OF THE '931 PATENT

48. I will now explain how the prior art references render claims 1-3, 6, and 8-10 of the '931 patent obvious.

A. Ground 1: Claims 1-3 and 8 are obvious under 35 U.S.C. §103 over Wu in view of Kikinis.

49. In my opinion, Wu in combination with Kikinis renders claims 1-3 and 8 of the '931 patent obvious for the following reasons:

1. A Person of Ordinary Skill in the Art Would Have Been Motivated to Combine Wu and Kikinis

50. It is my opinion that a skilled artisan would have been motivated to combine these references because both Wu and Kikinis are directed to a swivel mechanism for a monitor of a laptop computer.

51. Wu teaches a swivel mechanism for the display monitor of a laptop computer. (Wu at Abstract.) Wu recognized that the working efficiency and practicality of a laptop computer could be improved by providing a swivel mechanism that allowed for rotation about a horizontal axle and for rotation about a vertical axle. (Wu at 1:23-36.) Wu designed a swivel mechanism that provided for rotation about two perpendicular axles using a platform that could twist (rotate) about a vertical axle. (Wu at 1:63-2:9.) Wu also designed the swivel mechanism to allow rotation about a horizontal axle that is connected to the platform. (Wu at 2:10-43.)

52. A POSITA starting with Wu would have known that the laptop computer would need to include other hardware and components typically found in laptop computers. The POSITA would also understand that Wu only disclosed a swivel mechanism and did not address other features or aspects of a laptop computer. For example, Wu does not address the location or use of input/output ports commonly found on laptop computers. To build a complete laptop computer system, a POSITA would have looked at pre-existing and available laptop computers systems to build a complete laptop addressing the same efficiency and practical usefulness design goals addressed by Wu. The POSITA would have considered other laptop and electronic systems that improved the working efficiency and practicality of standard laptop computer systems.

53. A POSITA looking in this area would have found Kikinis's laptop computer and micro PDA system. Kikinis discloses a small PDA (or micro PDA) that used a direct parallel bus interface with a connector to plug into another computer, including a laptop computer system. (Kikinis at 2:12-14, 2:24-27.) Kikinis also discloses that a direct bus connection between the micro PDA's CPU and the host computer's CPU could be made. (Kikinis at 3:34-40.) Kikinis also describes locating PCMCIA slots at several locations along a laptop computer, including close to the front wall of its base. (Kikinis at Fig. 41.) Kikinis also shows that the host laptop computer has a flat screen, CPU, and circuitry for

communication between the PCMCIA slots and the CPU. A POSITA would have found it obvious to incorporate the laptop circuitry and hardware disclosed in Kikinis into Wu's laptop with a swivel mechanism for positioning of the flat panel display. This combination would further Wu's goal of providing a laptop computer system that improved upon the work efficiency and practicality of laptop computer systems. A POSITA would have been motivated to locate the PCMCIA slots of Kikinis or similar ports close to the front wall of the base to allow convenient connection of ancillary devices to provide various features and functionalities, including displaying images to the laptop users or other people viewing the laptop's display from nearby.

54. In my opinion, common design incentives would have motivated a POSITA to combine Wu and Kikinis leading to a predictable and obvious laptop computer system.

2. Claim 1 is obvious in light of Wu and Kikinis

- (1) *1. A computer system comprising: [1a] a) a keyboard unit including a computer keyboard and a keyboard base that includes a front wall and a back wall;*

55. Wu teaches a laptop computer system with a base that includes a computer keyboard with a front wall and a back wall. (Wu at 1:21-22, Figs. 1, 2, 4, 5.) The keyboard unit of Wu is depicted in Fig. 2. The base includes a front wall

and a back wall. (Wu at Fig. 2.) It is my opinion that Wu teaches the preamble and limitation 1[a].

- (2) *[1b] b) a display screen for displaying computer-generated images, said display screen defining first and second side walls, a bottom edge that extends from the first side wall to the second side wall and two spaced slots formed in said bottom edge;*

56. Wu discloses a monitor (*display screen*) for displaying computer-generated images. (Wu at 1:21-22, 1:28-30.) The monitor includes two sidewalls and a bottom edge that extends between the side walls. (Wu at Fig. 2.) The monitor has two spaced slots in the bottom edge to receive the fixed blocks 221 and 241 of the swivel mechanism. (Wu at 2:26-29, Figs. 2, 3.) Accordingly, it is my opinion that Wu teaches this limitation.

- (3) *[1c] c) a mounting assembly proximate said back wall of said keyboard base, said mounting assembly including two spaced mounting brackets extending upwardly from a rotatable element and configured and dimensioned to be received within said two spaced slots, said mounting assembly joining said display screen to said keyboard unit and permitting both rotational motion of said display screen relative to a first axis and pivotal motion of said display screen relative to a second axis that is perpendicular to said first axis; and*

57. Wu discloses a swivel mechanism (*mounting assembly*) that allows the monitor to rotate about a horizontal axle (*rotational motion ... relative to a first axis*), and rotate about a vertical axle (*pivotal motion ... relative to a second axis*). The vertical and horizontal axles are perpendicular to each other. (Wu at 1:15-18,

1:23-27, 1:59-63.) Wu's swivel mechanism connects the monitor to the base near the back wall of the base. (Wu at Figs. 2-3.) The swivel mechanism includes a fixed seat or platform (*rotatable element*) that rotates relative to the fixed base. (Wu at 1:63-64, 2:2-7, Fig. 3.) The longitudinal axles 22 and 24 (*spaced mounting brackets*) along with the fixed blocks protrude upward from the fixed seat. The axles and fixed blocks are arranged to fit inside the two spaced slots on the bottom edge of the monitor. (Wu at 2:10-16, 2:26-29, Fig. 3.) The axles are kept in position by two positioning plates and two side covers. (Wu at 2:29-41.) Wu's swivel mechanism allows the monitor to rotate with respect to the horizontal axles. (Wu at 2:41-43.) It is my opinion that Wu teaches this limitation.

- (4) *[1d] d) a port positioned proximate said front wall of said keyboard base, said port adapted to receive a signal from an ancillary computer system; [1e] wherein a signal from said ancillary computer system delivered to said port is effective to generate a computer-generated image on said display screen; and*

58. Wu shows ports and/or jacks on the side wall of the base in Fig. 2, but does not teach the specific type or use of these ports and jacks. This limitation would have been obvious in view of Kikinis. A POSITA looking to add common features to Wu's laptop, including displaying images or video on the laptop display from external components or an "ancillary computer system" would have found the Kikinis disclosure of terminals for connecting a micro PDA to a laptop and combined it with Wu. Kikinis teaches a laptop computer with a pivotable display

and a keyboard base. (Kikinis at 30:36-37.) Kikinis teaches several laptop embodiments, including one with the keyboard base having four PCMCIA-type module bays (*ports*). In this laptop embodiment, at least one of the bays is located close to the front wall of the keyboard base. (Kikinis at 30:41-45.) Kikinis also discloses a micro PDA (*ancillary computer system*) that is designed based on the PCMCIA standard Type II form factor and includes a connector at one end. (Kikinis at 5:66-6:11; Fig. 1A.) Kikinis teaches that the micro PDA can be docked into a host computer device, for example, the laptop computer shown in Fig. 41. Kikinis also teaches that the micro PDA can be configured to produce its display on the display of the host computer (laptop computer) screen. (Kikinis at 15:6-7.) The laptop computer can receive a signal from the micro PDA and generate an image on the flat screen display of the laptop. In this mode, the laptop computer display essentially becomes an external screen or monitor for the ancillary micro PDA. A POSITA would have understood that PCMCIA modules (like those used in the Kikinis laptop) could be and often were placed on laptop computers, including the laptop shown in Wu, and positioned close to the front wall of the keyboard base. A POSITA would have known that the PCMCIA slots or other ports located near the front wall of the base in Kikinis could be used in Wu's laptop computer to provide communication with ancillary computer systems and generate

an image on the laptop's display. Accordingly, it is my opinion that Wu in view of Kikinis discloses limitations 1[d] and 1[e].

- (5) *[1f] wherein said bottom edge of said display screen defines an intermediate region between said pair of slots and wherein a communication conduit extends from said keyboard base directly into said intermediate region of said display screen.*

59. Wu discloses that the bottom edge of the monitor has an intermediate region (framed by the inner sides 51 and 52) between the pair of slots. (Wu at Figs. 2-3, 2:26-29.) Wu also discloses that the swivel mechanism includes a hole and sits on top of a vertical hole in the positioning block. The positioning block is attached to a fixed frame of the keyboard base. (Wu at 1:64-68, Fig. 3.) Wu does not show or discuss a communication conduit that extends from the keyboard base into the monitor's intermediate region. But the vertical hole 131 and the hole in the fixed seat 11 suggests to a POSITA that a communication conduit obviously extends from the keyboard base directly into the intermediate region of the monitor to connect the laptop display monitor disclosed in Wu with the processing and graphics components of the laptop. A POSITA would have known that a communication conduit was required in laptop computer systems in order for the monitor to communicate with the processing and graphics components. And a POSITA would have found it obvious for the communication conduit to travel through the laptop's hinge mechanism to keep it internal to the laptop computer

system. Accordingly, it is my opinion that Wu along with the knowledge and common sense of a POSITA renders this limitation obvious.

60. The claim chart below provides the disclosures from Wu and Kikinis that in my opinion render claim 1 obvious to a POSITA at the time of the invention of the '931 patent.

Limitation	Wu and Kikinis
1[pre]. A computer system comprising:	<u>Wu:</u> 1:21-22: “This invention relates to a swivel mechanism for a monitor of a laptop computer.” Figs. 1, 2
[1a] a) a keyboard unit including a computer keyboard and a keyboard base that includes a front wall and a back wall;	<u>Wu:</u> Figs. 2, 4, 5
[1b] b) a display screen for displaying computer-generated images, said display screen defining first and second side walls, a bottom edge that extends from the first side wall to the second side wall and two spaced slots formed in said bottom edge;	<u>Wu:</u> 1:21-22: “This invention relates to a swivel mechanism for a monitor of a laptop computer.” 1:28-30: “It is another object of the present invention to provide a swivel mechanism which may widen the visible range.” 2:26-29: “The axles 22 and 24 are engaged with the monitor 5 and the fixed blocks 221 and 241 are respectively disposed beside the inner sides 52 and 51 of the monitor 5.” Figs. 2, 3
[1c] c) a mounting assembly proximate said back wall of said keyboard base, said mounting assembly including two spaced mounting brackets extending upwardly from a rotatable element and configured and dimensioned	<u>Wu:</u> 1:15-18: “It is, therefore, an object of the present invention to provide a swivel mechanism which enables the monitor of a laptop computer to rotate about a horizontal and a vertical axes.” 1:21-22: “This invention relates to a swivel mechanism for a monitor of a laptop computer.” 1:23-27: “It is the primary object of the present invention to provide a swivel mechanism which

Limitation	Wu and Kikinis
<p>to be received within said two spaced slots, said mounting assembly joining said display screen to said keyboard unit and permitting both rotational motion of said display screen relative to a first axis and pivotal motion of said display screen relative to a second axis that is perpendicular to said first axis; and</p>	<p>utilizes four tightly fitted axles in the same direction to be the horizontal axis of a monitor of a laptop computer and an upright axle to be the vertical axis thereof.”</p> <p>1:59-63: “With reference to the drawings and in particular to Figs. 1, 2 and 3 thereof, the swivel mechanism for a monitor of a laptop computer according to the present invention mainly comprises a vertical axle 1 and a horizontal axle 2.”</p> <p>2:2-7: “The bottom of the fixed seat 11 has an upright axle 115 formed with longitudinal raised lines and tightly fitted into the spring 12 thereby enabling the fixed seat 11 to rotate with respect to the fixed frame 14 and therefore, obviating the limit of vertical vision angle of 35 degrees.”</p> <p>2:10-14: “The horizontal axle 2 is mainly constituted by four longitudinal axles 21, 22, 23 and 24 in the same direction, four springs 25, 26, 27 and 28, two positioning plates 31 and 32, two side covers 41 and 42, and a protective cover 6.”</p> <p>2:26-29: “The axles 22 and 24 are engaged with the monitor 5 and the fixed blocks 221 and 241 are respectively disposed beside the inner sides 52 and 51 of the monitor 5.”</p> <p>Figs. 2, 3</p>
<p>[1d] d) a port positioned proximate said front wall of said keyboard base, said port adapted to receive a signal from an ancillary computer system;</p>	<p><u>Wu</u> Fig. 2</p> <p><u>Kikinis</u> 5:66-6:11: “FIG. 1A is an isometric view of a μPDA 10 according to an embodiment of the present invention. In this embodiment the unit is modeled on the PCMCIA standard Type II form factor, having a height D1 of about 5 mm. Body 12 is described in further detail below, and has a female portion 14 of a connector recessed at one end for engaging a mating male portion of the connector in a host computer, connecting the μPDA internal circuitry directly with a host internal bus. The host unit may be a notebook</p>

Limitation	Wu and Kikinis
	<p>computer having a docking bay for the μPDA. Docking bays may be provided in desktop and other types of computers, and even in other kinds of digital equipment, several examples of which are described below.”</p> <p>14:55-67: “FIG. 9 is a plan view of an enhanced I/O interface unit 79 according to an aspect of the present invention. Interface unit 79, with about a 5-inch diagonal measurement, comprises a combination LCD display at least partially overlaid by a touch-sensitive input screen, providing an I/O area 80 in much the same manner as in a μPDA. Four docking bays 81, 83, 85, and 87 are provided in the left and right edges of interface unit 79 in this embodiment, and are configured for PCMCIA type II modules. One of these bays may be used for docking a μPDA according to the present invention, and the other three to provide a larger CPU, additional memory, battery power, peripheral devices such as modems, and the like by docking functional PCMCIA modules.”</p> <p>15:6-7: “A docked μPDA in this embodiment is configured to produce its I/O display on I/O area 80.”</p> <p>28:56-29:9: “FIG. 38 is an enlarged isometric view of function module 1240 according to Type 2 PCMCIA standards. Back face 1252 includes a female connector 1253 for mating with a male connector positioned in each module bay, such as connector 1231 in FIG. 35B and FIG. 36. Connectors 1231 and 1253 are PCMCIA connectors and interface according to that industrial standard. Guide 1251A and 1251B are sized according to the PCMCIA standards.</p> <p>Function modules are provided in many models capable of a wide range of functions. For example, computer 1221 in one embodiment has no onboard CPU or system memory. These functions are provided by function modules that may be inserted</p>

Limitation	Wu and Kikinis
	<p>in any one of the available module bays. Other kinds of function modules that may be inserted include I/O system modules that provide speech-based, pen-based or keyboard based input. There are also floppy-disk drives, hard-disk drives, flashcard memory modules, LAN and modem adapters, Fax modules, specialty modules such as data acquisition modules adapted to specific equipment, specialty video modules, modules to adapt scanner peripherals [sic] to the computer, telephone adapters, and more.”</p> <p>30:40-49: “There are two PCMCIA-type module bays 1412A and 1412B on one side of the case, and two more (not shown) on the side opposite. The four PCMCIA module bays are arranged in a planar array as described above. A frame 1415 contains a bus structure (not shown) that interconnects all aspects of the PCMCIA type module bays to computer 1400 as described above. In this embodiment of the present invention, a standard keyboard controller (not shown) enclosed in frame 1415 connects keyboard 1403 to the internal bus structure.”</p> <p>Figs. 1A, 41</p>
<p>[1e] wherein a signal from said ancillary computer system delivered to said port is effective to generate a computer-generated image on said display screen; and</p>	<p><u>Kikinis</u> See claim chart for Kikinis citations for limitation 1[d] immediately above</p>
<p>[1f] wherein said bottom edge of said display screen defines an intermediate region between said pair of slots and wherein a communication conduit extends from said keyboard base directly into said intermediate region of said display screen.</p>	<p><u>Wu</u> 1:64-2:7: “The positioning block 13 is a generally rectangular member disposed on a fixed frame 14 within a main body 10 through a hole 7. The positioning block 13 is formed with a vertical hole 131 in which is mounted the spring 12. The fixed frame 14 is installed by known means which has no need to be described here in detail. The bottom of the fixed seat 11 has an upright axle 115 formed with longitudinal raised lines and tightly fitted into the spring 12 thereby enabling the fixed seat 11 to rotate</p>

Limitation	Wu and Kikinis
	<p>with respect to the fixed frame 14 and therefore, obviating the limit of vertical vision angle of 35 degrees.”</p> <p>2:26-29: “The axles 22 and 24 are engaged with the monitor 5 and the fixed blocks 221 and 241 are respectively disposed beside the inner sides 52 and 51 of the monitor 5.”</p> <p>Figs. 2-3</p>

3. Claim 2 is obvious in light of Wu and Kikinis

- (1) *2. A computer system according to claim 1, further comprising a central processing unit mounted within said keyboard unit.*

61. Claim 2 depends from claim 1 and adds: “*further comprising a central processing unit mounted within said keyboard unit.*” Kikinis discloses a laptop computer that includes a CPU in the base. (Kikinis at 11:34-38; Fig. 6.) A POSITA would have incorporated Kikinis’ CPU into Wu’s laptop to perform various processes and control various functions because CPUs were an essential component of a laptop computer (or any computer system). At the time of the invention, laptops used CPUs and it would have been obvious to include a CPU in Wu’s laptop system. Accordingly, it is my opinion that Wu in view of Kikinis renders claim 2 obvious.

62. The claim chart below provides the disclosures from Wu and Kikinis that in my opinion render claim 2 obvious to a POSITA at the time of the invention of the ’931 patent.

Limitation	Wu and Kikinis
<p>2. A computer system according to claim 1, further comprising a central processing unit mounted within said keyboard unit.</p>	<p><u>Kikinis</u> 11:34-38: “Host computer 66 is represented in a mostly generic form, having a host CPU 24, and input device 60, such as a keyboard, a mass storage device 28, such as a hard disk drive, and system RAM 62. It will be apparent to those with skill in the art that many hosts may have a much more sophisticated architecture, and the architecture shown is meant to be illustrative.” Fig. 6</p>

4. Claim 3 is obvious in light of Wu and Kikinis

- (1) **3.** A computer system according to claim 1, wherein said display screen is a flat screen unit.

63. Claim 3 depends from claim 1 and adds: “*wherein said display screen is a flat screen unit.*” It is my opinion that Wu discloses a flat screen. (Wu at Fig. 2.) The ’931 patent also states that: “Laptop computers generally employ flat-panel monitors for reasons of necessity, given space/weight constraints and the desire to pivotally mount the monitor relative to the base/keyboard for system protection and portability.” (’931 patent at 1:60-63.)

64. Additionally, a POSITA would have used the flat-panel display in Kikinis in Wu’s laptop. Kikinis teaches that the laptop display is a flat-panel display. (Kikinis at 30:36-40, Fig. 41.) At the time of the invention, as the ’931 patent admits, flat-panel units were typically used in laptop systems. Laptops universally employed flat screen displays, with several different types of displays being available. A laptop having a flat-panel display is not an inventive

contribution to the art and would have been totally obvious to a POSITA at the time of filing the '931 patent. Accordingly, it is my opinion that Wu in view of Kikinis renders claim 3 obvious.

65. The claim chart below provides the disclosures from Wu and Kikinis that in my opinion render claim 3 obvious to a POSITA at the time of the invention of the '931 patent.

Limitation	Wu and Kikinis
3. A computer system according to claim 1, wherein said display screen is a flat screen unit.	<u>Wu</u> Fig. 2 <u>Kikinis</u> 30:36-40: “Computer 1400 comprises an attached pivotable display case 1401 and a fixed keyboard 1403. The display case rotates about a hinge 1405 and closes in a fixed detented position above the keyboard. Display case 1401 comprises a flat-panel display 1407.” Fig. 41

5. Claim 8 is obvious in light of Wu and Kikinis

- (1) *8. A computer system according to claim 1, wherein said ancillary computer system is selected from the group consisting of a desktop computer, a personal digital assistant, a palmtop computer, a hand-held computer, an electronic book, and a pocket computer.*

66. Claim 8 depends from claim 1 and adds: “wherein said ancillary computer system is selected from the group consisting of a desktop computer, a personal digital assistant, a palmtop computer, a hand-held computer, an electronic book, and a pocket computer.” As I described for claim 1 above, Kikinis teaches

that the micro PDA can be connected to a host laptop computer. (Kikinis at 5:66-6:11, 15:6-7.) Accordingly, it is my opinion that Wu in view of Kikinis renders claim 8 as obvious.

67. The claim chart below provides the disclosures from Wu and Kikinis that in my opinion render claim 8 obvious to a POSITA at the time of the invention of the '931 patent.

Limitation	Wu and Kikinis
<p>8. A computer system according to claim 1, wherein said ancillary computer system is selected from the group consisting of a desktop computer, a personal digital assistant, a palmtop computer, a hand-held computer, an electronic book, and a pocket computer.</p>	<p><u>Kikinis</u> 5:66-6:11: “FIG. 1A is an isometric view of a μPDA 10 according to an embodiment of the present invention. In this embodiment the unit is modeled on the PCMCIA standard Type II form factor, having a height D1 of about 5 mm. Body 12 is described in further detail below, and has a female portion 14 of a connector recessed at one end for engaging a mating male portion of the connector in a host computer, connecting the μPDA internal circuitry directly with a host internal bus. The host unit may be a notebook computer having a docking bay for the μPDA. Docking bays may be provided in desktop and other types of computers, and even in other kinds of digital equipment, several examples of which are described below.” 14:55-67: “FIG. 9 is a plan view of an enhanced I/O interface unit 79 according to an aspect of the present invention. Interface unit 79, with about a 5-inch diagonal measurement, comprises a combination LCD display at least partially overlaid by a touch-sensitive input screen, providing an I/O area 80 in much the same manner as in a μPDA. Four docking bays 81, 83, 85, and 87 are provided in the left and right edges of interface unit 79 in this embodiment, and are configured for PCMCIA type II modules. One of these bays may be used for</p>

Limitation	Wu and Kikinis
	<p>docking a μPDA according to the present invention, and the other three to provide a larger CPU, additional memory, battery power, peripheral devices such as modems, and the like by docking functional PCMCIA modules.”</p> <p>15:6-7: “A docked μPDA in this embodiment is configured to produce its I/O display on I/O area 80.”</p> <p>30:40-49: “There are two PCMCIA-type module bays 1412A and 1412B on one side of the case, and two more (not shown) on the side opposite. The four PCMCIA module bays are arranged in a planar array as described above. A frame 1415 contains a bus structure (not shown) that interconnects all aspects of the PCMCIA type module bays to computer 1400 as described above. In this embodiment of the present invention, a standard keyboard controller (not shown) enclosed in frame 1415 connects keyboard 1403 to the internal bus structure.”</p> <p>Figs. 1A, 41</p>

B. Ground 2: Claims 9 and 10 are obvious over Wu in view of Kikinis and Anderson.

68. In my opinion, Wu in combination with Kikinis and Anderson renders claims 9 and 10 of the '931 patent obvious for the following reasons:

1. A Person of Ordinary Skill in the Art Would Have Been Motivated to Combine Wu and Anderson

69. It is my opinion that a POSITA would have been motivated to combine these references before the time of the invention of the '931 patent because both Wu and Anderson are directed to a swivel mechanism for a laptop display. Wu and Anderson both use a swivel hinge mechanism to provide rotation

of a laptop display about two perpendicular axes. Wu and Anderson both use a swivel hinge mechanism to improve the convenience, functionality, and usability of a laptop display screen. (Wu at 1:10-14, 1:31-36; Anderson at 1:30-54.) Wu and Anderson both rotate the display about two perpendicular axes to improve the functionality and usefulness of the laptop. This concept is precisely the same technique used in the '931 patent. (Wu at Figs. 2, 5; Anderson at Figs. 2-3; '931 at Fig. 4.) Additionally, Anderson addresses a similar issue in a similar way as Wu. (Also see ¶¶ 33, 34, 35 above).

70. A POSITA would have had a reasonable (and high) expectation of success combining Wu and Anderson because there are a finite number of ways in which these components could have been configured to address Wu's objectives. As one example, Anderson uses stops to limit angular rotation about the vertical axis. (Anderson at Abstract, Figs. 7-9.) Anderson also discloses a communication cable passing through the swivel mechanism. (Anderson at 6:38-43, 6:47-55, Figs. 7-9.) It would have been obvious to a POSITA to use the swivel stops of Anderson in the swivel mechanism of Wu. The swivel stops would prevent excessive twist of the communication cable, which is a practical requirement in order to avoid very undesirable accelerated wear and damage to the cable. A POSITA would have combined Wu with Anderson because this would have provided an obvious, simple means to prevent damage to the communication cable

between the monitor and keyboard base. The Wu device concept was ready for improvement, and the combination of Wu with Anderson yields a predictable result.

71. Additionally, a POSITA would have looked to the rotation mechanism of Anderson to improve the simplicity of the swivel mechanism in Wu. Wu's objectives include a simple hinge construction or design. (Wu at 1:37-38.) Like Wu, Anderson teaches a turret design with rotation about the vertical and horizontal axes that occur with respect to a single rotatable element. Because a POSITA would have recognized that Anderson's circular mounting ring simplified Wu's swivel mechanism design, it would have been obvious to incorporate Anderson's circular opening into Wu's laptop.

2. Claim 9 is obvious over Wu in view of Kikinis and Anderson

- (1) **9.** *A computer system according to claim 1, further comprising at least one stop for limiting rotational motion of said display screen relative to said keyboard base.*

72. Claim 9 depends from claim 1 and adds: "*further comprising at least one stop for limiting rotational motion of said display screen relative to said keyboard base.*" As shown above, it is my opinion that Wu in combination with Kikinis renders claim 1 obvious. A POSITA would recognize the need to design a swivel and tilt mechanism that did not over twist the communication cable or

conduit. With this design goal, a POSITA would have looked to Anderson and its disclosure of a swivel mechanism with a stop because the stop would prevent excessive twisting of the conduit from continual and over rotation in the same direction. Rotation stops limit the amount of communication conduit twisting. Anderson teaches stop tabs 72 positioned in the swivel mechanism to contact stop blocks 70 and limit the rotation about the vertical axis of the swivel mechanism and the display screen. (Anderson at 4:63-5:2, 5:7-18, Figs. 7 and 9.) The stop tabs and stop blocks of Anderson limit the screen's rotation to 60 degrees. (Anderson at 5:7-18.) Accordingly, it is my opinion that the combination of Wu and Kikinis in view of Anderson renders claim 9 obvious.

73. The claim chart below provides the disclosures from Wu in view of Kikinis and Anderson that in my opinion render claim 9 obvious to a POSITA at the time of the invention of the '931 patent.

Limitation	Wu, Kikinis, and Anderson
<p>9. A computer system according to claim 1, further comprising at least one stop for limiting rotational motion of said display screen relative to said keyboard base.</p>	<p><u>Anderson</u> 4:63-5:2: “The peripheral edge of the swivel disk 46 rides in a channel or groove 62 formed on the inner circumference of the mounting ring 54. The groove 62 retains the swivel disk 46 in a close sliding fit. A stop block 70 is provided within the groove 62 approximately 90° around the perimeter of the ring 54 from the adjoining ends (i.e., approximately halfway between the two ends).” 5:7-18: “The outer rim of the disk 46 includes two outwardly projecting stop tabs 72, spaced apart from each other by approximately 120° around the perimeter of the disk. The stop tabs 72 project within</p>

Limitation	Wu, Kikinis, and Anderson
	<p>the groove 62 of the mounting ring 54 to contact the stop blocks 70. Both stop tabs 72 are disposed angularly forward of the stop blocks 70, and the orientation of the stop tabs 72 is such that the swivel disk 46 has a 60° range of movement. Thus, as in the illustration of Fig. 7, the swivel disk 46 may turn 30° from the neutral position shown in either direction of arrow 52 before the stop tabs 72 hit the stop blocks 70.”</p> <p>Figs. 7, 9</p>

3. Claim 10 is obvious over Wu in view of Kikinis and Anderson

- (1) *10. A computer system according to claim 1, wherein said rotatable element of said mounting assembly defines a turret that is rotatable relative to a circular opening formed in said keyboard base.*

74. Claim 10 depends from claim 1 and adds: “wherein said rotatable element of said mounting assembly defines a turret that is rotatable relative to a circular opening formed in said keyboard base.” Wu discloses that the swivel mechanism includes a fixed seat 11 that is fitted into the circular spring 12 and vertical hole 131. (Wu at 1:64-68, 2:2-7, Figs. 2-3.) The fixed seat (rotatable element or turret) rotates relative to the vertical hole (circular opening) attached to the keyboard base. (Wu at 1:64-68, Figs. 2-3.) Accordingly, it is my opinion that Wu in view of Kikinis renders obvious claim 10.

75. Additionally, it is my opinion that this limitation is obvious in view of Anderson. A POSITA looking for a simple hinge construction that could rotate

about two perpendicular axes would have found Anderson's disclosure. Anderson teaches that the swivel hinge sits on a circular mount or swivel disk 46 (turret) and the swivel disk rotates about a vertical axis relative to a circular mounting ring 54 (circular opening) affixed to the laptop's base. (Anderson at 4:24-27, 4:30-38, Figs. 1, 2, 7, 8.) A POSITA would have known that the swivel mechanism of Wu could be adapted to provide the swivel mechanism of Anderson to provide a simpler and more aesthetically pleasing swivel construction. Accordingly, it is my opinion that the combination of Wu and Kikinis in view of Anderson renders claim 10 obvious.

76. The claim chart below provides the disclosures from Wu in view of Kikinis and Anderson that in my opinion render claim 10 obvious to a POSITA at the time of the invention of the '931 patent.

Limitation	Wu, Kikinis, and Anderson
<p>10. A computer system according to claim 1, wherein said rotatable element of said mounting assembly defines a turret that is rotatable relative to a circular opening formed in said keyboard base.</p>	<p><u>Wu</u> 1:64-68: "The positioning block 13 is a generally rectangular member disposed on a fixed frame 14 within a main body 10 through a hole 7. The positioning block 13 is formed with a vertical hole 131 in which is mounted the spring 12." 2:2-7: "The bottom of the fixed seat 11 has an upright axle 115 formed with longitudinal raised lines and tightly fitted into the spring 12 thereby enabling the fixed seat 11 to rotate with respect to the fixed frame 14 and therefore, obviating the limit of vertical vision angle of 35 degrees." Figs. 2-3</p>

Limitation	Wu, Kikinis, and Anderson
	<p><u>Anderson</u></p> <p>4:24-27: “Referring to Fig. 7, the tilt/swivel hinge 26 generally comprises a cover attachment yoke 42 which tilts about a tilt base 44 attached to a circular mount or swivel disk 46.”</p> <p>4:30-34: “The tilt base 44, the attached yoke 42 and the swivel disk 46 rotate about a vertical axis in either direction shown by a double-headed arrow 52 relative to a swivel mounting ring 54 affixed to the base 22 of the computer.”</p> <p>4:35-38: “With reference to both Figs. 7 and 9, the swivel mounting ring 54 forms a continuous circle defined by a two-part plastic assembly held together with machine screws 56 and threaded holes 60 at their abutting ends.”</p> <p>Figs. 1, 2, 7, 8</p>

C. Ground 3: Claim 6 is obvious under 35 U.S.C. §103 over Wu in view of Kikinis and Ioka.

1. A Person of Ordinary Skill in the Art Would Have Been Motivated to Combine Kikinis and Ioka.

77. A POSITA would have been motivated to combine Wu and Ioka before the time of the invention of the '931 patent. Wu and Ioka are from the same field. And both use a swivel hinge assembly to provide rotation of a laptop display screen about two perpendicular axes. Both use a swivel hinge assembly for similar objectives to improve the convenience, functionality, and usability of laptop computers. For example, a rotatable display screen improves accessibility and viewing angles relative to the laptop display screen. (Wu at 1:10-14, 1:31-36);

Ioka at ¶ 3.) Because Ioka solves the same issue in a similar way as Wu, a POSITA would have been motivated to consider Ioka for other beneficial features.

78. A POSITA would have a reasonable expectation of success combining Wu and Ioka because they provided similar solutions and there are a finite number of ways to improve upon the convenience and versatility of the laptop display swivel mechanism. As one example, Ioka discloses at least 180 degrees of rotation of the display about the vertical axes to allow someone sitting across from the laptop user to view the screen. (Ioka at ¶ [0003]). A POSITA would have combined the disclosure of Wu with the disclosure in Ioka of providing at least 180 degrees of rotation about the vertical axes because this would have furthered the common goal of improving the convenience and functionality of a laptop system. Based on the teachings of Ioka, a POSITA would have recognized the value of modifying the swivel mechanism of Wu to allow for at least 180 degrees of rotation about a vertical axis so that display could be rotated to share with nearby persons.

2. Dependent claim 6.

- (1) *6. A computer system according to claim 1, wherein said mounting assembly permits angular motion of said display screen relative to said keyboard base of at least one hundred eighty degrees.*

79. As shown above, Wu in view of Kikinis renders claim 1 obvious.

Claim 6 depends from claim 1 and adds: “wherein said mounting assembly

permits angular motion of said display screen relative to said keyboard base of at least one hundred eighty degrees.” Wu discloses a swivel mechanism to widen the visible range of the monitor and to increase the working efficiency of the laptop. (Wu at 1:28-33.) A POSITA looking to further widen the visible range of a laptop display and increase a laptop’s working efficiency would have found Ioka’s disclosure of a display screen that could rotate at least 180 degrees. Ioka teaches a display screen that can be pivoted by 180 degrees (via the hinge mechanism) with respect to the computer body and closed with the display facing up. (Ioka at Fig. 5.) Because the hinge mechanism of Ioka allows for up to 180 degrees of rotation about the vertical axis in either direction, Ioka teaches up 360 degrees of rotation of the display screen about the vertical axis. A POSITA would have known that the swivel mechanism of Wu could be adapted as taught by Ioka to swivel about the vertical axis by at least 180 degrees. Accordingly, it is my opinion that Wu in view of Kikinis and Ioka renders claim 6 obvious.

80. The claim chart below provides the disclosures from Wu in view of Kikinis and Ioka that in my opinion render claim 6 obvious to a POSITA at the time of the invention of the ’931 patent.

Limitation	Wu, Kikinis, and Ioka
6. A computer system according to claim 1, wherein said mounting assembly permits angular motion of said display	<u>Ioka</u> [0007]: “Moreover, since the connection part 30 prevents the severing of the wire between the main unit 10 and the display part 20, the angle of rotation is restricted in a range from +180° to -180° for the

Limitation	Wu, Kikinis, and Ioka
screen relative to said keyboard base of at least one hundred eighty degrees.	rotation in the perpendicular direction of the display part when the angle of the front surface of the display panel of the above-mentioned display part is set at 0°.” Figs. 1, 5

D. Ground 4: Claims 1 and 8 are obvious under 35 U.S.C. §103 over Wu in view of Kumar.

1. A Person of Ordinary Skill in the Art Would Have Been Motivated to Combine Wu and Kumar.

81. It is my opinion that a POSITA would have been motivated to combine the Wu and Kumar references.

82. A POSITA starting with Wu’s disclosure of a swivel mechanism would have known that the laptop computer would still need to include other common hardware and components. The POSITA would also understand that Wu only discloses a laptop computer mounting mechanism which allows for rotation about two perpendicular axes. A POSITA would have looked to laptop computer systems available to provide a laptop system that further Wu’s efficiency and practicality objectives.

83. A POSITA researching this technology area would have used the laptop computer of Kumar with ports on the front wall of the laptop base. Kumar discloses multiple input/output ports on the front wall of the base. (Kumar at 4:21-24.) Kumar also discusses that laptop computers interact with a wide variety of input/output devices that have various functions. (Kumar at 1:22-25.) It would

have been obvious to incorporate the discussion of input/output ports from Kumar with the laptop of Wu that incorporates a swivel mechanism to improve the efficiency, usability, and practicality of the laptop. A POSITA would have recognized that input/output ports on or near the front wall would have been an obvious location selection (although not the only desirable location) because it would allow the user to connect ancillary devices while displaying content or images from the ancillary devices to the laptop flat-panel display and to nearby persons.

84. The Wu and Kumar references also both come from the same field of portable computers. The combination of Wu and Kumar results in a predictable variation and makes this combination an obvious combination of existing prior art elements.

2. Independent Claim 1

85. As shown above, Wu discloses or renders obvious the preamble and limitations 1[a], [b], [c], and [f]. (See ¶¶ 55, 56, 57, 59).

86. While Wu shows ports and jacks on the side wall of the laptop base, Wu does not teach what these ports and jacks are precisely in terms of their function. It is my opinion that limitations 1[d] and 1[e] would have been obvious in view of Kumar. Kumar discloses multiple input/output ports on the base's front wall. (Kumar at 4:21-24.) Kumar also discusses that laptop computers interact

with a variety of types of input/output devices with a variety of functions and features. (Kumar at 1:22-25.) Because it includes input/output ports on the front wall, which input/output ports could be connected to a variety of devices, the laptop computer of Kumar is capable of receiving a signal from an ancillary computer input device and generating a computer-generated image. Input/output ports, such as those disclosed in Kumar, could be placed on other laptop computers and positioned close to or on the front wall of the laptop base. A POSITA would have known that the input/output ports on the front wall of the base in Kumar could be used by Wu's laptop to communicate with ancillary computer systems and generate an image on the laptop's display from the ancillary computer system. For example, a POSITA would have been familiar at the time of the invention of the '931 patent with display ports that would have allowed the laptop computer system to project computer-generated images from connected computer systems. Accordingly, it is my opinion that Wu in view of Kumar discloses limitations 1[d] and 1[e] of the '931 patent.

87. The claim chart below provides the disclosures from Wu and Kumar that in my opinion render claim 1 obvious to a POSITA at the time of the invention of the '931 patent.

Limitation	Wu and Kumar
[1pre]-[1c]	<u>Wu</u> See claim chart in Section IX(A)(2) (Ground 1) for Wu citations for limitations [1pre]-[1c]
[1d] d) a port positioned proximate said front wall of said keyboard base, said port adapted to receive a signal from an ancillary computer system;	<u>Wu</u> Fig. 2 <u>Kumar</u> 1:15-25: “Since the advent of the personal computer, manufacturers and industrial users have continually developed faster, smaller and more versatile machines, including portable computers that are dedicated to perform a specific function such as word processing, data collection or item identification. Alternatively, portable computers may be all purpose computing machines capable of running a variety of types of software programs. These portable personal computers may interact with a variety of portable and stationary peripheral input/output devices such as printers, light pens, image scanners, video scanners, etc.” 4:21-24: “Additionally, portable computer 2 is normally provided with a plurality of input/output ports such as port 20 extending through front wall 9, and port 21 extending through sidewall 8.” Figs. 4-5
[1e] wherein a signal from said ancillary computer system delivered to said port is effective to generate a computer-generated image on said display screen; and	<u>Kumar</u> See claim chart in this table for Kumar citations for limitations [1d] immediately above
[1f] wherein said bottom edge of said display screen defines an intermediate region between said pair of slots and wherein a communication conduit extends from said keyboard	<u>Wu</u> See claim chart in Section IX(A)(2) (Ground 1) for Wu citations for limitations [1f]

Limitation	Wu and Kumar
base directly into said intermediate region of said display screen.	

3. Dependent Claim 8

- (1) *8. A computer system according to claim 1, wherein said ancillary computer system is selected from the group consisting of a desktop computer, a personal digital assistant, a palmtop computer, a hand-held computer, an electronic book, and a pocket computer.*

88. Claim 8 depends from claim 1 and adds: “wherein said ancillary computer system is selected from the group consisting of a desktop computer, a personal digital assistant, a palmtop computer, a hand-held computer, an electronic book, and a pocket computer.” As described for claim 1 above, Kumar teaches a plurality of input/output ports on the front wall of a laptop’s base. (Kumar at 4:21-24, Figs. 4-5.) Kumar’s input/output ports suggest to a POSITA that ancillary devices could be connected to input/output ports. (Kumar at 1:22-25.) Kumar teaches that input/output devices, such as printers, light pens, image scanners, video scanners, etc., could be connected to the input/output ports of the laptop. (Kumar 1:22-25.) In addition to these example devices disclosed by Kumar, a POSITA would understand that many other types of input/output devices including ancillary computer systems could be connected to the laptop via appropriate input/output ports on the front wall of the base. These ancillary devices could

include one of a desktop computer, a personal digital assistant, a palmtop computer, a hand-held computer, an electronic book, and a pocket computer. Accordingly, it is my opinion that Wu in view of Kumar renders claim 8 obvious.

89. The claim chart below provides the disclosures from Wu and Kumar that in my opinion render claim 8 obvious to a POSITA at the time of the invention of the '931 patent.

Limitation	Wu and Kumar
<p>8. A computer system according to claim 1, wherein said ancillary computer system is selected from the group consisting of a desktop computer, a personal digital assistant, a palmtop computer, a hand-held computer, an electronic book, and a pocket computer.</p>	<p><u>Kumar</u> 1:15-25: “Since the advent of the personal computer, manufacturers and industrial users have continually developed faster, smaller and more versatile machines, including portable computers that are dedicated to perform a specific function such as word processing, data collection or item identification. Alternatively, portable computers may be all purpose computing machines capable of running a variety of types of software programs. These portable personal computers may interact with a variety of portable and stationary peripheral input/output devices such as printers, light pens, image scanners, video scanners, etc.” 4:21-24: “Additionally, portable computer 2 is normally provided with a plurality of input/output ports such as port 20 extending through front wall 9, and port 21 extending through sidewall 8.” Figs. 4-5</p>

E. Ground 5: Claims 3, 9, and 10 are obvious over Wu in view of Kumar and Anderson.

90. In my opinion, Wu in combination with Kikinis and Anderson renders claims 3, 9, and 10 of the '931 patent obvious for the following reasons:

1. A Person of Ordinary Skill in the Art Would Have Been Motivated to Combine Wu and Anderson

91. As discussed above for Ground 2 in Section IX(B)(1), it would have been obvious to combine the swivel hinge of Wu with the flat panel display, rotational stop, and rotatable turret of Anderson. (See ¶¶ 69-71).

2. Dependent Claim 3

(1) **3. A computer system according to claim 1, wherein said display screen is a flat screen unit.**

92. Claim 3 depends from claim 1 and adds: “*wherein said display screen is a flat screen unit.*” As described above for Ground 1, Wu discloses a monitor that is a flat screen. (See ¶ 63.)

93. Additionally, a POSITA would have incorporated Anderson’s flat-panel display into Wu’s laptop. Anderson discloses a liquid crystal display (LCD). (Anderson at 1:19-26, Figs. 1-2.) At the time of the invention of the ’931 patent, flat-panel displays were always used for laptops and would have been used in Wu. Accordingly, it is my opinion that Wu in view of Kumar and Anderson renders claim 3 obvious.

94. The claim chart below provides the disclosures from Wu, Kumar, and Anderson that in my opinion render claim 3 obvious to a POSITA at the time of the invention of the ’931 patent.

Limitation	Wu, Kumar, and Anderson
3. A computer system according to claim 1, wherein said display screen is a flat screen unit.	<p><u>Wu</u> Fig. 2</p> <p><u>Anderson</u> 1:19-26: “Liquid crystal displays (LCDs) are used in many personal computer screens. LCDs are desirable for personal computers in that they are lightweight and have an extremely low power consumption in contrast to cathode ray tube (CRT) displays of conventional desktop computers. In addition, an LCD generally retains a great clarity of display in the presence of bright light.” Fig. 41</p>

3. Dependent Claim 9

- (1) **9.** *A computer system according to claim 1, further comprising at least one stop for limiting rotational motion of said display screen relative to said keyboard base*

95. Claim 9 depends from claim 1 and adds: “*further comprising at least one stop for limiting rotational motion of said display screen relative to said keyboard base.*” As I discussed above in Section IX(B)(2) for Ground 2, Anderson discloses this limitation. (See ¶ 72). The claim chart providing the disclosures from Anderson that in my opinion render claim 9 obvious to a POSITA at the time of the invention of the ’931 patent is provided in Section IX(B)(2) for Ground 2.

4. Dependent Claim 10

- (1) **10.** *A computer system according to claim 1, wherein said rotatable element of said mounting assembly defines a turret that is rotatable relative to a circular opening formed in said keyboard base*

96. Claim 10 depends from claim 1 and adds: “wherein said rotatable element of said mounting assembly defines a turret that is rotatable relative to a circular opening formed in said keyboard base.” As I discussed above in Section IX(B)(3) for Ground 2, Wu and/or Anderson discloses this limitation. (See ¶¶ 74-75). The claim chart providing the disclosures from Wu and Anderson that in my opinion render claim 10 obvious to a POSITA at the time of the invention of the ’931 patent is provided in Section IX(B)(3) for Ground 2.

F. Ground 6: Claims 2 and 6 are obvious over Wu in view of Kumar and Ioka.

97. In my opinion, Wu in combination with Kumar and Ioka renders claims 2 and 6 of the ’931 patent obvious for the following reasons:

1. A Person of Ordinary Skill in the Art Would Have Been Motivated to Combine Wu and Ioka

98. As described above for Ground 3 in Section IX(C)(1), a POSITA would have found it obvious to combine the swivel hinge of Wu with the rotational limits of Ioka. (See ¶¶ 77-78).

2. Dependent Claim 2

- (1) **2.** *A computer system according to claim 1, further comprising a central processing unit mounted within said keyboard unit.*

99. Claim 2 depends from claim 1 and adds: “*further comprising a central processing unit mounted within said keyboard unit.*” Ioka discloses a portable information processor with a CPU in the base. (Ioka at ¶ [0006]). A POSITA would have incorporated Ioka’s CPU into Wu’s laptop to perform the various processes and control various computing functions typical of laptop computers at the relevant time. At the time of the invention, CPUs were essential to laptops and would have been obvious to include in Wu’s laptop. Accordingly, it is my opinion that Wu in view of Kumar and Ioka renders claim 2 obvious.

100. The claim chart below provides the disclosures from Wu, Kumar, and Ioka that in my opinion render claim 2 obvious to a POSITA at the time of the invention of the ’931 patent.

Limitation	Wu, Kumar, and Ioka
2. A computer system according to claim 1, further comprising a central processing unit mounted within said keyboard unit.	<u>Ioka:</u> [0006]: “A description of the embodiment of the present invention is provided on based on the figures. As shown in Figure 1, the portable information processor in the present embodiment is composed of a main unit 10 that has a power supply, CPU and memory inside it, and keys for data entry on the upper surface thereof, a display part 20 that has a display panel on the top surface, and a connection part 30 that connects the display part 20

Limitation	Wu, Kumar, and Ioka
	rotatably in the perpendicular direction relative to the main unit 10 and the direction that is orthogonal to the perpendicular direction. Here the display part 20 has an input coordinate position determination device with which pen touch is possible.”

3. Dependent Claim 6

- (1) **6.** *A computer system according to claim 1, wherein said mounting assembly permits angular motion of said display screen relative to said keyboard base of at least one hundred eighty degrees.*

101. As shown above for Ground 4, Wu in view of Kumar and Anderson renders claim 1 obvious. (See ¶¶ 55-57, 59, 85-86.) Claim 6 depends from claim 1 and adds: “*wherein said mounting assembly permits angular motion of said display screen relative to said keyboard base of at least one hundred eighty degrees.*” As I discussed above in Section IX(C)(2) for Ground 3, Ioka discloses this limitation. (See ¶ 79). The claim chart providing the disclosures from Ioka that in my opinion render claim 6 obvious to a POSITA at the time of the invention of the ’931 patent is provided in Section IX(C)(2) for Ground 3.

X. CONCLUSION

102. For the reasons presented above, it is my opinion that the applied references support obviousness Grounds 1-6, as set forth in this Petition.

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

Dated: May 6, 2017

A handwritten signature in black ink, appearing to read "T. Kim Parnell". The signature is fluid and cursive, with the first name "T." and last name "Parnell" clearly legible.

T. Kim Parnell, PhD, PE