

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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GARMIN LTD.  
AND ZEPP HEALTH CORPORATION,  
Petitioners

v.

SLYDE ANALYTICS, LLC.,  
Patent Owner

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Case No. IPR2024-00006  
U.S. Patent No. 8,588,033

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**SUPPLEMENTAL DECLARATION OF BENJAMIN B. BEDERSON IN  
SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF  
U.S. PATENT NO 8,588,033**

## **I. INTRODUCTION AND QUALIFICATIONS**

1. I have been asked to respond to certain issues raised by Patent Owner in Patent Owner's Response ("*Response*") dated July 28, 2024 and by the supporting declaration of Thomas Blackadar. All of my opinions expressed in my original declaration (Ex-1002) remain the same, and I have applied the legal framework set forth in my original declaration (Ex-1002), which I incorporate by reference herein. Additionally, as before, I offer the below opinions and background knowledge from the lens of a person having ordinary skill in the art at the time of the earliest possible priority date of the '033 Patent, which I have been told to assume is March 30, 2010. I have reviewed the relevant portions of the POR in connection with preparing this supplemental declaration.

2. As part of my work and in forming my opinions in connection with this proceeding, I have reviewed the following materials. For any prior art listed below, it is my opinion persons of ordinary skill in my field would reasonably rely upon such prior art in forming opinions regarding the subject matter of this proceeding:

- Materials relied on in my previous Declaration;
- The Institution Decision (Paper 13);
- Patent Owner's Response (POR);
- Declaration of Dr. Blackadar (Ex-2004);

- Transcript of Deposition of Dr. Blackadar (Ex-1070)  
("Blackadar Tr.");
- <https://www.itprotoday.com/microsoft-windows/watch-out-spot-devices-due-this-fall> (Ex-1053)
- <https://news.microsoft.com/2002/11/17/microsoft-launches-smart-personal-object-technology-initiative/> (Ex-1054)
- [https://www.gsmarena.com/lg\\_gd910-2644.php](https://www.gsmarena.com/lg_gd910-2644.php) (Ex-1055)
- <https://www.computinghistory.org.uk/det/43164/matsucom-OnHand-PC/> (Ex-1056)
- Benjamin B. Bederson. (1992). A Miniature Space-Variant Active Vision System: Cortex-I. New York University Dissertation, Computer Science Department. (Ex-1057)
- Benjamin B. Bederson. (1995). Audio Augmented Reality: A Prototype Automated Tour Guide. ACM CHI Conference Companion, pp. 210-211.  
<https://dl.acm.org/doi/pdf/10.1145/223355.223526> (Ex-1058)
- Benjamin B. Bederson, Aaron Clamage, Mary Czerwinski, and George Robertson. 2004. *DateLens: A Fisheye Calendar*

*Interface for PDAs*. ACM Transactions on Computer-Human Interaction. Vol 11, No. 1. March 2004, Pages 90-119. (Ex-1059)

- Benjamin B. Bederson, Amir Khella, 2004, “Pocket PhotoMesa: A Zoomable Image Browser for PDAs” (Ex-1060)
- iPod Nano 6<sup>th</sup> Gen User Guide, 2010 (Ex-1061)
- Sony LiveView User Guide, 2010 (Ex-1062)
- Microsoft Computer Dictionary Fifth Edition, 2002 (Ex-1063)
- US Patent Application No. 2005/0278757 to Grossman et al. (Ex-1064)
- US Patent No. 11,061,524 to Bederson et. al. (Ex-1065)
- <https://web.archive.org/web/20090322202310/http://www.tinyos.net/> (Ex-1067)
- [https://appledb.dev/device/iPod-nano-\(6th-generation\).html](https://appledb.dev/device/iPod-nano-(6th-generation).html) (Ex-1068)
- <https://arstechnica.com/gadgets/2011/01/6g-ipod-nano-hack-just-beginning-of-long-road-to-nano-apps/> (Ex-1069)

**II. THE STATE OF THE ART WAS FURTHER ADVANCED THAN PATENT OWNER AND MR. BLACKADAR REPRESENT.**

3. I have considered the arguments made by Patent Owner and Mr. Blackadar regarding the state of the art in 2010, and I disagree with their depiction of the state of the art at that time. *See e.g., Response*, 15-17.

4. Specifically, I understand that Patent Owner and Mr. Blackadar take the position that (1) in 2010 “wearable devices...were programmed primarily using bare-metal-embedded code” but “mobile devices had full mobile operating systems” and “ran multi-threaded software to implement the functionality,” (2) developers only had several small footprint real-time operating systems available to them and industry leaders did not develop operating systems for wearable devices until years after the ’033 patent’s priority date, (3) issues such as “[c]ompressing data structures, the use of RAM, flash memory, and static memory [were] all considerations for wristwatches but were not large concerns of the mobile device development environments of the time,” and (4) because “the largest draw on an operating system was the RAM and storage in microcontrollers,” it was “impractical to embed[] such an OS into a watch.” *Id.* For the reasons discussed below, I disagree.

**A. Whether Wearable Devices in 2010 Were Programmed Primarily Using Bare-Metal Embedded Code or Operating Systems.**

5. In support of its proposed level of skill in the art, PO argues that “wearable devices in 2010 (the priority date of the ’033 Patent) were programmed

primarily using bare-metal-embedded code”<sup>1</sup> while “mobile devices had full mobile operating systems such as Android and iOS.” *Response*, 15.

6. As I discussed in my initial declaration, IBM proved in 2001 that you could run an operating system on a wristwatch, publicly demonstrating its IBM **Linux** watch that had “a powerful processor capable of running the Linux operation system version 2.2[.]” Ex-1002, ¶¶57-58 citing Ex-1008; Ex-1021. In fact, IBM chose Linux because it “worked on a system with limited memory and computing power.” Ex-1021, 36.



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<sup>1</sup> I note that PO and Mr. Blackadar do not attempt to define what bare-metal-embedded code means. From context, I assume that they are referring to the programming technique which involves writing code directly for a system’s hardware rather than, for example, relying on an operating system. Mr. Blackadar confirmed my understanding during his deposition. Ex-1070, 22:21-23:5.

*Id.* Thus nearly a decade prior to the prior date of the '033 patent, an industry leader demonstrated that it was possible to run an operating system on a wristwatch. I did not see this watch considered in Patent Owner's Response or Mr. Blackadar's declaration.

7. I also read and considered the argument made in Patent Owner's Response that "industry leaders Google (Android), Samsung, and Apple" did not release watches with an operating system until 2012, 2013, and 2015, respectively, which Patent Owner argues suggests that operating systems for watches were not available until much later. *Response*, 16. I disagree. In making this argument, Patent Owner and its expert cherry-pick the wristwatches they consider, while ignoring commercially available options available from IBM, Microsoft, LG, Sony Ericsson, and indeed even Apple from 2010 and earlier that all used operating systems.

8. Very shortly after IBM, Microsoft released a commercial wearable watch with an operating system in 2002, called "Microsoft Spot." It used "Microsoft .NET-based OS called TinyCLR."<sup>2</sup>

9. Further, the background technology section of the '033 Patent cites US Patent Application No. 2005/0278757 to Microsoft. '033 Patent, 1:66-2:3. US Patent

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<sup>2</sup>Ex-1053, <https://www.itprotoday.com/microsoft-windows/watch-out-spot-devices-due-this-fall>; Ex-1054, <https://news.microsoft.com/2002/11/17/microsoft-launches-smart-personal-object-technology-initiative/>

Application No. 2005/0278757 teaches a watch that may include “an operating system 264 such as the Windows CE operating system from Microsoft Corporation or another operating system[.]” Ex-1064 (US 2005/0278757), Abstract, 0087.

10. In early 2009, LG Electronics released the LG GD910, which used LG’s Proprietary OS.<sup>3</sup>



Ex-1055.

11. And, in 2010, the same year as the alleged invention, Apple released the iPod nano (6<sup>th</sup> generation), which was sold with watch bands and could be worn as a watch. Ex-1061. It included an operating system (Pixo OS) and interchangeable clock faces. *Id. See* Ex-1068, Ex-1069, Ex-1061.

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<sup>3</sup> Ex-1055, [https://www.gsmarena.com/lg\\_gd910-2644.php](https://www.gsmarena.com/lg_gd910-2644.php)

12. Also in 2010, Sony Ericsson released LiveView, a wearable device with an operating system that could run third-party plugins from Google’s Play Store (including plugins relating to a watch faces). Ex-1062.

13. Therefore, around the time of the invention at least five “industry leaders”—IBM, Microsoft, LG, Apple, and Sony Ericsson<sup>4</sup>—had implemented an operating system on a small wearable device. For at least these reasons, Patent Owner’s claim that “wearable devices in 2010 (the priority date of the ’033 Patent) were programmed primarily using bare-metal-embedded code” (*Response*, 15) is entirely wrong.

14. For the same reasons, I disagree with Patent Owner’s claim that industry leaders did not develop operating systems for wearable devices until years after the ’033 patent’s priority date. *Id.* at 16. As discussed, industry leaders had absolutely developed wearable devices with operating systems by 2010.

15. For the same reasons, I disagree with Patent Owner’s claim that it was “impractical to embed[] such an OS into a watch” in 2010. *Id.* at 16. I further disagree with that allegation because, as noted below, the disclosures of the ’033 patent and

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<sup>4</sup> If I consider non-household names, the list gets even longer. For example, more than a decade prior to the ’033 priority date in 1998, the Matsucom OnHand PC wristwatch, ran an operating system known as “W-PS-DOS version 1.16. Ex-1056, <https://www.computinghistory.org.uk/det/43164/matsucom-OnHand-PC/>.

the prior art relied on in the petition would not have been understood by a POSITA to be limited to bare-metal-embedded code.

**B. The '033 Patent Does Not Support the Idea that the Invention Must Have Been Implemented Using Bare-Metal-Embedded Code in 2010.**

16. Bare-metal-embedded code is not mentioned in the '033 patent claims or specification, nor was it mentioned during prosecution. A POSITA would understand that the '033 patent accordingly does not require the invention to be implemented with bare-metal-embedded code.

17. Moreover, Dr. Blackadar admits that “several small footprint real time operating systems” were available at the time such as TinyOS. Ex-2004, 17. (“developers only had several small footprint real time operating systems available to them”). TinyOS is designed for small, limited-resource embedded systems which a POSITA would understand applies to watches. Ex-1067. (“TinyOS is an open-source operating system designed for wireless embedded sensor networks. It features a component-based architecture which enables rapid innovation and implementation while minimizing code size as required by the severe memory constraints inherent in sensor networks.”) Dr. Blackadar further admits that environments for developing applications were used on wristwatches. Ex-2004, ¶55 (“Seiko and Timex provided the first application-like environment for watches”); Ex-1070 (*Blackadar Tr.*), 21:1-4 (Q: Did that Timex watch use an operating system?

A: It was a custom one from Timex, such that they were able to draft up an API....”). This reaffirms the idea that not all devices at the time of the ’033 Patent had to use bare-metal-embedded code.

18. I also note that Mr. Blackadar said without explanation or specific citation: “As Philip Levis describes, a POSITA would have known that TinyOS would have to be customized to an inordinate extent to fit into a watch processor.” Ex-2004, ¶45. When I read the cited paper by Philip Levis, I found no such statements or sentiments. In fact, what he said was, “This paper examines how technical and social decisions encouraged or restricted the growth of TinyOS and therefore its impact on practice, sometimes in unforeseen ways. For example, **fine-grained software components allow users to easily customize the OS with small, local changes.**” Ex-2007, 1 (emphasis added). The paper goes on to further describe TinyOS: “TinyOS's design has two major goals: minimizing resource use and preventing bugs.” *Id.* at 2 “The minimization principle states that TinyOS software should use as few hardware resources as possible. This means being computationally efficient (minimizing cycle counts and wake time), requiring little state (minimizing RAM), and having very tight code (minimizing code ROM).” *Id.* “TinyOS focuses on producing an ultra-optimized binary that can run unattended for months to years.” *Id.* at 3.

19. In making statements about TinyOS, Mr. Blackadar appears to be relying on his own experience from the early 2000s. The state of the art had sufficiently changed by 2010, so that in my opinion, Mr. Blackadar's experience with TinyOS is not strongly relevant to the operation of TinyOS on watches in 2010.

C. **The Disclosures of Mooring and Satoshi Confirm My Understanding.**

20. The prior art references relied on in the Petition likewise provide evidence that the state of the art presented by Patent Owner and its expert is inaccurate.

21. Mooring provides evidence that a POSITA developing a watch with the features claimed in the '033 Patent would have used an operating system. Mooring explains that a category of watches called “smart watch[es]” was already being sold, which could “provide consumers access to news, weather, sports, stocks, instant messenger, e-mail, and horoscopes on a liquid crystal display (LCD)[,]” all on a watch. *Mooring*, [0004]. Mooring also contains over a dozen references to software. For example, it discloses that:

A modular movement comprises a movement subassembly that includes a touchscreen; a printed circuit board including a memory and **a processor for executing software that displays a user interface on the touchscreen and**

**operates the modular movement**, and a battery, wherein the subassembly is a complete working mechanism;

*Mooring*, [0012] (emphasis added).

Microprocessor **614** and/or DSP may be capable of **concurrently executing multiple software routines**, including system code, to control the various processes of the modular movement **12 b**. In one embodiment, **microprocessor 614 may comprise an Advanced RISC Machine (ARM) processor or the like** may be used, for example.

*Id.* at [0057].

In addition, the embodiments **can be implemented using hardware, software, a computer readable medium containing program instructions, or a combination thereof**. Software written according to the present invention is to be either stored in some form of computer-readable medium such as memory or is to be transmitted over a network, and is to be executed by a processor.

*Id.* at [0077].

22. A POSITA would have understood that these disclosures are consistent with watches that include operating systems. This is at least because of the descriptions of the microprocessor running “concurrently executing multiple software routines.” Ex-1063, 122. This kind of threaded processing is one of the

important features that operating systems provide. They run multiple software routines a little bit at a time, very quickly switching between them. In this way, it appears that multiple routines are running at the same time – and all this happens without the software routines themselves having to manage that. A POSITA would have been strongly discouraged from implementing concurrently executing multiple software routines without operating system support.

**D. There is Always a Concern for Memory and Processing Availability During Development of Features for Any Computing Device.**

23. Finally, I considered the assertion of Patent Owner and Mr. Blackadar that “[c]ompressing data structures, the use of RAM, flash memory, and static memory [were] all considerations for wristwatches but were not large concerns of the mobile device development environments of the time.” *Response*, 15-16.

24. I strongly disagree. Compression and memory constraints are and have always been concerns when developing a portable device of any sort. For example, I wrote an article titled “Pocket PhotoMesa: A Zoomable Image Browser for PDAs” that stated such. Ex-1060, Abstract. (“The limitations introduced by these devices such as screen resolution, processing power and storage impose a challenge for multimedia applications designed for larger displays to adapt to small screens.”) This has been true from the very first days of computing and is no less true today. There are always memory and processing constraints to be considered during development

of any computing device. I do not understand why Patent Owner or its expert would suggest that mobile devices are the exception and indeed they provide no reasoning or citation to support their conclusion. In any event, I disagree.

### **III. LEVEL OF ORDINARY SKILL IN THE ART**

25. In my original declaration, I explain that a POSITA would have had a bachelor's degree in electrical engineering, computer science, computer engineering, or a related field, and 2-3 years of experience in the research, design, development, or testing of touchscreen applications and graphical user interfaces for mobile devices with additional education substituting for experience and vice-versa. Ex-1002, ¶¶35-39.

26. I understand that PO instead proposes that a POSITA would have had “a bachelor's degree in electrical engineering, computer science, computer engineering, or a related field, and 5-6 years of experience in the research, design, development, or testing of touchscreen applications and graphical user interfaces for small wearables with additional education substituting for experience and vice-versa.” *Response*, 15.

27. I have considered PO's argument and the related declaration support provided by Mr. Blackadar and my position has not changed. Because PO and its expert are incorrect in their assessment of how wearable devices in 2010 were programmed, their proposed level of skill in the art does not reflect their position. If

the proposed level of skill in the art requires experience with “small wearables,” then that does not necessarily say one way or the other whether the POSITA would have to have experience in bare-metal-embedded code. Furthermore, I don’t believe the proposed 5-6 years experience in small wearables is necessary given the technology at issue, and experience with bare-metal embedded code is definitely not necessary.

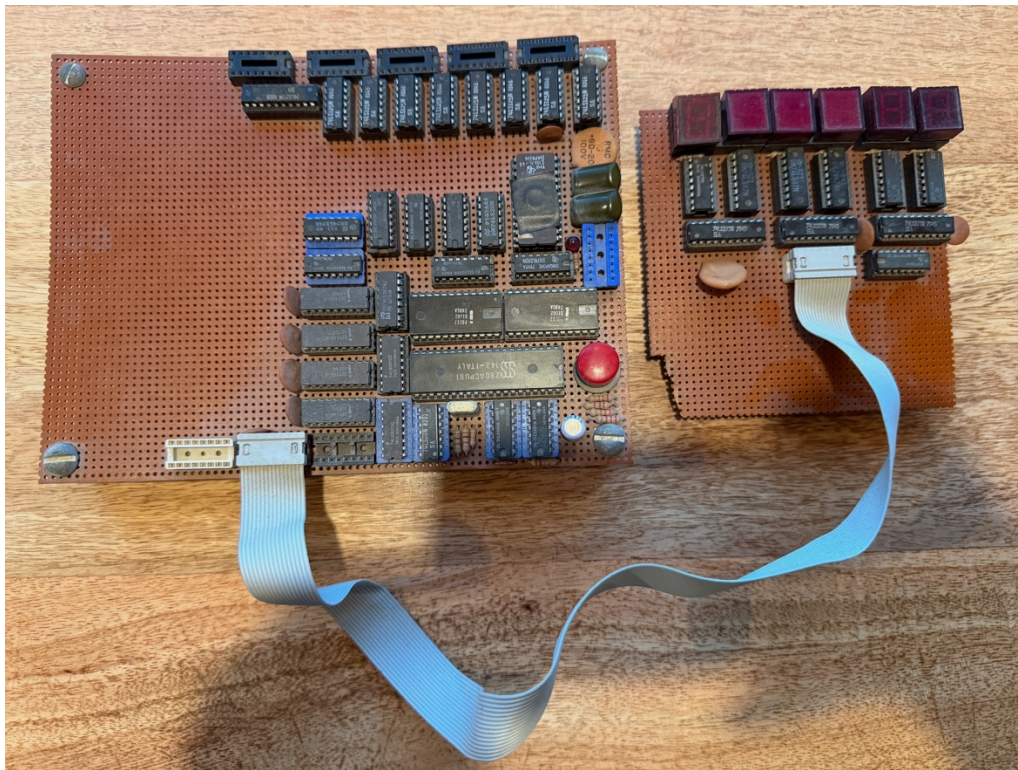
28. Notably, while I disagree with the level of skill in the art proposed by PO, I still qualify as a POSITA under that standard.

29. As best I can understand, PO is arguing that a POSITA would have required additional years of experience because it is more difficult to develop a device using bare-metal-embedded code (e.g., writing code directly for system hardware) rather than using an operating system. As discussed below, I disagree that that would have been required to implement this invention in 2010. In my deposition, PO did not ask me about my bare metal coding experience. Instead, PO was focused on my wearable device experience. Nevertheless I had specific experience of this kind even back in 2010.

30. While I explained some of my relevant qualifications in my original declaration, I describe here additional experience with small wearable computers and bare-metal-embedded code.

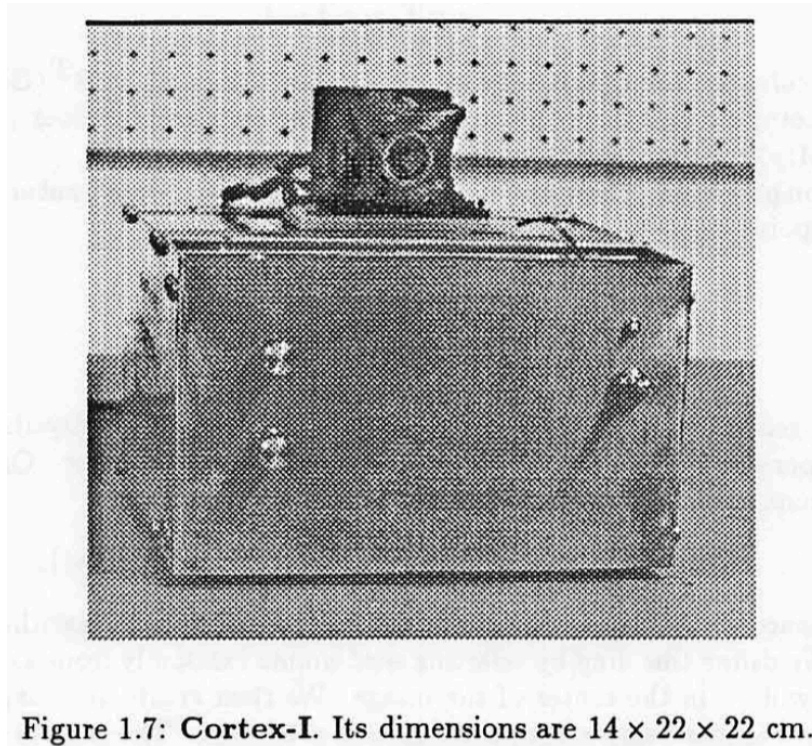
31. Starting in about 1980, I programmed 6502 assembly code on an Apple II Plus computer for 2-3 years. I did not use any operating system, but rather directly

mapped the graphics memory system and wrote interactive graphic applications. For 2 years in high school, I managed our school's mini-computer, including booting it from paper tape – loading bare-metal code in order to start up the system. In 1982 and 1983, I hand built a Z80 computer that I then programmed with bare-metal embedded code and no operating system. I still have that computer, which is shown in the photo below.



32. In around 1983, I wrote x86 assembly code for Windows PC in the form of “Terminate and Stay Resident” programs to provide low level device drivers for printers. I took courses where I further learned assembly programming and wrote numerous assembly programs over about two years.

33. In 1989-1992, I did my dissertation research<sup>5</sup> hand building a custom image processing computer including a Motorola MC68332 Microcontroller and Analog Devices AD2101 Digital Signal Processor. I wrote significant code for that system – all bare-metal embedded code – without any operating system. I won the Janet Fabri Memorial Award for Outstanding Doctoral Dissertation for that research and was issued 3 U.S. patents based on that work (US 5,175,617; US 5,204,573; and US 5,642,167). The figure below shows the system I built and it is described in the following excerpt from my dissertation (pp. 15-16).



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<sup>5</sup> Ex-1057 Benjamin B. Bederson. (1992). *A Miniature Space-Variant Active Vision System: Cortex-I*. New York University Dissertation, Computer Science Department.

## 1.5 System description

The **Cortex-I** (Figure 1.7) integrates a custom miniature logmap camera, *pan-tilt actuator*, controller, general purpose processors, and display. The entire system takes up a volume less than a third of a cubic foot.

The camera (Chapter 2) consists of a miniature commercially available CCD image sensor and a custom lens assembly mounted in the actuator. The camera image is mapped to a logmap image with a fast algorithm described in Section 2.4. Its maximum resolution is 0.175 degrees per pixel and its horizontal field of view measures 33°. The sensor has a fixed focus 4mm lens with a manually changeable aperture (3 sizes). Imaged objects more than 40 mm away from the lens are in focus. The system outputs up to 30 frames per second and measures 256 gray levels per pixel. The camera head (CCD and lens assembly) measures only 8 × 8 × 10 mm. A driver board controls the camera, providing timing signals to the sensor and converting analog sensor data to 8-bit digital data.

A preliminary actuator called the *Platform Pantilt* (Chapter 3) moves a platform by raising and lowering two shafts with linear stepper motors that are attached to the platform with universal joints. This actuator was built as a fall-back position before the Spherical Pointing Motor was operational. The Platform Pantilt measures 7.5 × 7.5 × 12 cm and can move at rotational velocities up to 100°/sec.

The *Spherical Pointing Motor* (SPM) replaces the Platform Pantilt because of its superior accuracy, speed, and size. The SPM (Chapter 4) is a novel pan-tilt actuator using three orthogonal motor windings to achieve open-loop pan-tilt actuation of the camera sensor in a small, low-power package. The SPM can orient the sensor through approximately 60° pan and tilt, at speeds of several hundred degrees per second. It measures 4 × 5 × 6 cm and its mass is 170 grams.

The controller consists of a camera driver, a 2 MIPS programmable microcontroller (Motorola MC68332), a video display driver, a 12 MIPS digital signal processor (Analog Devices AD2101) DSP that maps the uniform camera image to a space-variant image, and an optional DSP board that acts as a video telephone. The actuator and camera are mounted to the chassis (14 × 22 × 22 cm) and connected by twisted-pair cables. The prototype is powered from a standard 110 Volt AC line, but uses less than 25 watts and could be battery powered.

The microcontroller controls the SPM and runs the application software. The MC68332 may be connected to a host processor for applications development, to upload sensor data, or to receive pan-tilt commands. The MC68332 is a 32-bit 16 MHz microcontroller integrating peripheral controls, such as programmable digital control lines and timing signals, directly on chip. We connected 192 Kbytes RAM and 128 Kbytes EPROM to the microcontroller. The microcontroller inputs the logmap data via a high speed serial interace from the DSP.

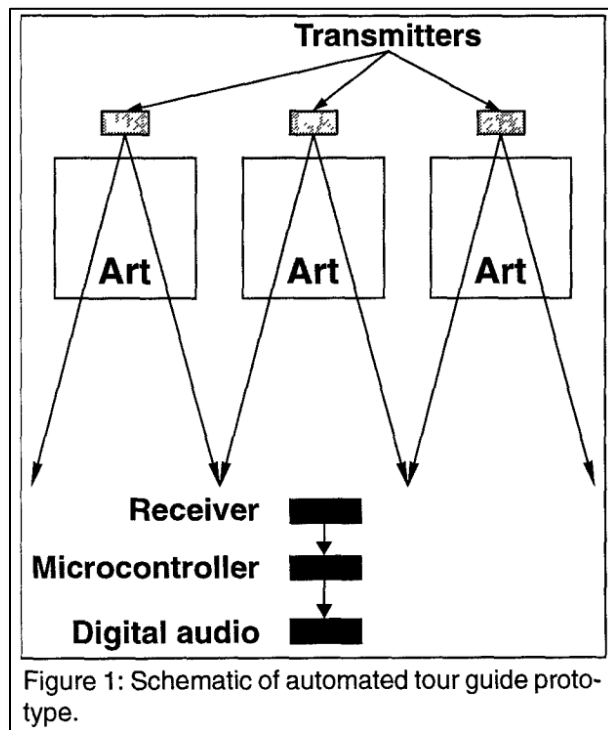
We have implemented image processing demonstrations in the microcontroller ROM. A simple motion tracking program, that turns the camera to center the observed motion field, runs at 16 frames per second (fps). The ROM also contains a test pattern, image binarization (22 fps) and a motor motion demo. We also use the connectivity graph [57], to implement image smoothing (3 fps), edge detection (2 fps) and connected components (1 fps), illustrating both the generality of the programming model and the limitations of the microcontroller in the current prototype.

The Analog Devices 2101 digital signal processor (DSP) reads the uniform CCD image and maps it to a space-variant image. It outputs the logmap over a high-speed serial connection. The DSP board combines an AD 2101 12 MHz DSP having two 2 MHz serial ports, 8 Kbytes internal RAM, 80 Kbytes external RAM, and 64 Kbytes boot EPROM. A second identical DSP board functions as a video display driver, generating an RS-170 video output suitable for display on a standard TV monitor. An optional third DSP board is used as a video transmitter that can send 4 frames per second of logmap images over a standard voice-grade telephone line.

34. In 1995, I wrote a paper<sup>6</sup> about an automated tour guide system that I designed and built that automatically provided audio information about a museum piece that a person was standing in front of. It worked by having infrared transmitters embedded in the ceiling, an infrared receiver in the user's headphones, and a microcontroller that controlled a digital audio player. I wrote bare-metal embedded code to control the entire system. In this system "[t]his prototype consists of a few devices that the viewer carries with them: a random-access digital audio source (modified Sony<sup>TM</sup> MiniDisc player), and a custom infrared receiver that tells the computer where the viewer is." Ex-1058, 211. It is illustrated in the following figure from that paper.

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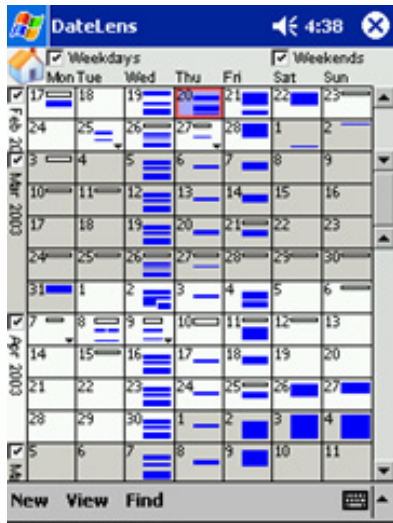
<sup>6</sup> Ex-1058, Benjamin B. Bederson. (1995). *Audio Augmented Reality: A Prototype Automated Tour Guide*. ACM CHI Conference Companion, pp. 210-211. <https://dl.acm.org/doi/pdf/10.1145/223355.223526>



Ex-1058, Fig. 1.

35. Starting in 2001 and continuing for about 15 years, I wrote code for small wearable devices – first for the Microsoft PocketPC platform, then for Apple iPhones, and then also for Google’s Android phones. For example, I wrote code for DateLens as described in a 2004 paper<sup>7</sup>, a calendar application for the PocketPC platform. I did this in collaboration with Microsoft and was invited to demo the software with Bill Gates in about 2002 at a conference.

<sup>7</sup> Ex-1059, Benjamin B. Bederson, Aaron Clamage, Mary Czerwinski, and George Robertson. 2004. *DateLens: A Fisheye Calendar Interface for PDAs*. ACM Transactions on Computer-Human Interaction. Vol 11, No. 1. March 2004, Pages 90-119.



36. That led to my co-founding of Zumobi, Inc., a company that built mobile software for multiple platforms. I was involved in writing software for those mobile devices at Zumobi for about 10 years, resulting in numerous issued U.S. Patents such as US Patent 11,061,524 titled “Techniques to modify content and view content on mobile devices.”

37. Based on this experience and the other experiences described in detail in my original declaration and in my deposition, I am qualified as a POSITA even under PO’s proposed definition.

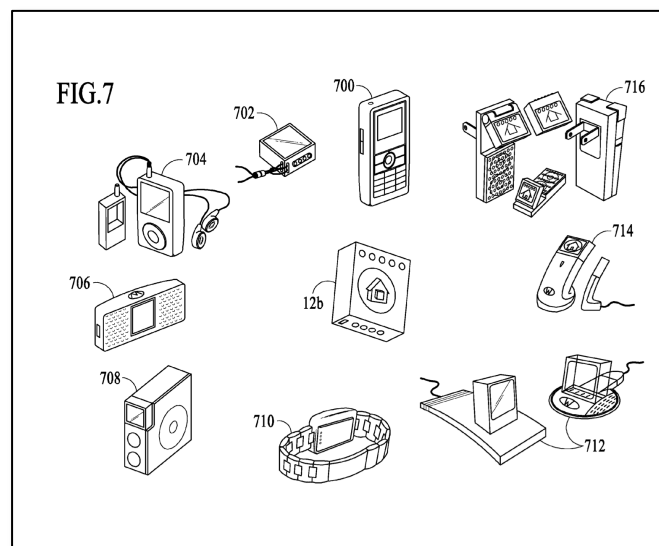
#### **IV. MOTIVATION TO COMBINE MOORING AND SATOSHI**

38. I have considered Mr. Blackadar’s arguments regarding why he believes a POSITA would not have combined Mooring and Satoshi as proposed in the Petition, but they do not change any of my opinions.

39. First, for the reasons discussed above, I disagree with Patent Owner’s description of the state of the art. Above, I identify a number of examples of

sophisticated wristwatches that relied on operating systems and had a wide variety of functionalities. Mooring also notes that a category of watches called “smart watch[es]” was being sold which could “provide consumers access to news, weather, sports, stocks, instant messenger, e-mail, and horoscopes on a liquid crystal display (LCD)[,]” all on a watch. *Mooring*, [0004]. Accordingly it is my opinion that a POSITA already had known that there were resource-intensive functions available on a mobile phone could be transferred to a watch.

40. Second, I understand that PO argues that because Mooring teaches a wristwatch and Satoshi teaches a mobile phone, there would be no reason to combine them. *Response*, 21-22. But Mooring described an invention that was “both fully functional standalone as well as interchangeable in *other portable devices*, such as watches” but also including other types of portable devices including a cell phone handset:



*Mooring*, Fig. 7. *Mooring* explicitly states that the modular movement 12b could be used with a phone, telephone, or a watch:

“FIG. 7 is a diagram illustrating exemplary types of **portable device form factors that could be used with modular movement 12 b** and receptacle 22. As shown exemplary types of portable devices that may include standard receptacles 22 for use with modular movement 12 b may include a **cell phone handset 700**, a carrier and strap 702, a media player 704, portable speakers 706, battery dock recharger and speaker 708, **a watch 710**, a media handset and cradle 712, a **telephone handset 714**, and a portable charging cradle 716 for the modular movement 12 b.”

*Mooring*, 0068. (emphasis added). That *Mooring* and Satoshi both contemplate a mobile phone application for their disclosures supports the POSITA’s motivation to combine.

41. Third, PO argues that even though the same physical components—LCD screens and microcontrollers—are present in both mobile devices and wristwatches, they are somehow so fundamentally different in those two applications that *Mooring* and Satoshi would not be combined. *Petition*, 22. *Response*, 21-26. As my original declaration explains, Patent Owner’s position is

incorrect. Notably, Mooring expressly teaches in its background section that “watches equipped with electronic movements may include *digital displays and small computers that are used in many types of electronic devices*” and the same paragraph goes on to specifically identify “a liquid crystal display (LCD).” *Mooring*, [0004]. Accordingly, Mooring confirms that my position is correct and any differences between LCD screens and microcontrollers used in a mobile phone versus in a wristwatch are inconsequential to the relevant analysis.

42. LCD touch screens were widely used in watches and mobile devices before the '033 patent. *See, e.g.*, Ex-1002, ¶¶55-63. I do not see that Patent Owner or its expert have identified any relevant distinctions between how an LCD screen in a watch and an LCD screen in a mobile device operated in 2010, much less any relevant to this analysis, and I am not aware of any.

43. Likewise, I do not see that Patent Owner or its expert have identified any specific distinctions between how a microcontroller that could be used in a watch and a microcontroller that could be used in a mobile device operated in 2010, much less any that are relevant to this analysis, and I am not aware of any. I do see that Patent Owner pointed generically to “differing size and power capabilities of microcontrollers between mobile phones and wristwatches” (*Response*, 26), but, as discussed immediately below, Patent Owner provides no reason to believe that these differences would have prevented the microcontroller of Mooring from being

sufficient for use with the gear train simulation disclosed by Satoshi, and I am not aware of any such reasons.

44. I also considered, but was confused by Patent Owner's claim that the '033 patent describes and aims to solve the "problem that...microcontrollers for wristwatches could not be compared or combined with microcontrollers for mobile phones or larger computing devices[.]" *Response*, 23-24; Ex-2004, ¶¶54-55. The words "mobile device" and "phone" do not appear in the '033 Patent and I see no disclosures in the '033 Patent that suggest this purported "problem." Accordingly, I disagree with this argument made by Patent Owner as well. The '033 Patent instead explains that "there is a need for a watch enabling its user to admire the operation of the mechanical movement whilst providing the accuracy and price comparable to those of a quartz watch." '033 Patent at 2:12-15. Neither in this disclosure or anywhere else in the '033 Patent would a POSITA understand there to be a teaching or suggestion that "wristwatches could not be compared or combined with microcontrollers for mobile phones or larger computing devices" as Patent Owner claims.

45. A POSITA would understand that the '033 Patent teaches the opposite, admitting that the currently available microcontrollers are, in fact, sufficient for the purposes of the claimed invention:

The invention is based on the observation that the computational power of the current watch microcontrollers (i.e. microcontrollers of a size and with a power consumption compatible with a watchmaking application) enables a realistic simulation of a complex mechanical movement to be calculated and displayed in real time.

'033 Patent, 2:53-58. In other words, certain microcontrollers that are compatible with applications other than a watchmaking application are also compatible with a watchmaking application.

46. Ultimately, Patent Owner's arguments misrepresent my opinions because they ask the wrong question. The '033 Patent does not impose functional requirements for the claimed microcontroller, other than that it be sufficient for the claimed functions e.g., displaying a simulation of a mechanical watch movement. Accordingly, the question is not whether a wristwatch would have had hardware capable of all of the functionalities that a mobile phone would have been capable of in 2010, which seems to be the requirement that Patent Owner advocates for. Instead, the key question is whether a POSITA would have understood that Mooring's microprocessor would be sufficient to support the proposed combination with Satoshi's watch face and gears. A POSITA would have had more than a reasonable expectation of success in making the proposed combination, particularly considering

Mooring's express disclosure of interchangeably using the same microprocessor in both a watch form factor and a phone form factor. *Mooring*, 0068.

47. I note that in arguing to the contrary, Patent Owner and Mr. Blackadar misrepresent the disclosures of Satoshi.

48. They first quote paragraph 5:

However, current mobile phones are in demand that enable long-time usage as a phone using the limited power of a battery and that are compact and lightweight, and there are hardware limits such as memory storage capacity and the processing capability of an arithmetic processing device, and Java for embedded devices used in mobile phones is set such that only limited arithmetic processing can be executed depending on the hardware mentioned above.

Ex-1007, [0005], quoted by Ex-2004 at ¶ 56.

49. I take from this paragraph simply that Satoshi was aware that mobile phones, like all computing devices, have limits. Satoshi simply notes the unremarkable fact that mobile phone users at the time sought compact and lightweight devices that could be used for a long time. Likewise, Satoshi recognizes that mobile phones, like all hardware then and now, have limited battery life, memory, and processing availability. Satoshi's description of "Problems to be solved by the invention" in paragraph 0005 simply identifies this well-known fact of

product development. It is my opinion that a POSITA would not take from this paragraph that Satoshi was, therefore, “very concerned” that there would be insufficient computational resources available to display gears on a screen; such a claim goes well beyond Satoshi’s disclosures.

50. A POSITA reading these disclosures from the “PROBLEMS TO BE SOLVED BY THE INVENTION” section of the reference would also consider the context. In the following paragraphs, Satoshi identifies three specific features that could be taxing on memory and processing power of the device. Satoshi explains that (1) it takes a lot of memory and processing to animate gears in real-time based on user input instead of using a “preset gear rotating display,” (2) high memory is required to have image data for different colored gears, and (3) storage capacity will only hold a finite number of “Java applets.” Ex-1007, [0006]-[0008]. A POSITA would understand that the ’033 Patent claims require none of these features. Accordingly, I disagree with Mr. Blackadar that the general statements in Paragraph 5 of Satoshi indicate that its relevant disclosures would be so memory-intensive that they could not be implemented in the proposed combination with Mooring.

51. Second, I disagree with Mr. Blackadar’s assumption that Satoshi “solved” the computational resources problem “by relying upon an Internet connection.” The paragraph he quotes says no such thing:

The present applicants set out to develop, as content provided on a mobile phone having an internet connection environment, a program for displaying an animation of interactively operable gears of any number for mobile phone users to arrange and display in a plurality of combinations.

Ex-1007, [0004], quoted by Ex-2004, ¶57.

52. This paragraph states unremarkably that the mobile phone of Satoshi's invention had an internet connection. It does not follow from this or any other disclosures of Satoshi that, as Patent Owner asserts, "a POSITA would have understood that Satoshi moved components of its Java applet to the internet when his java applet needed more memory" or that "the code size of such a Java implementation would be enormous." *Response*, 25.

53. This paragraph says nothing about moving components of anything to the internet. I disagree that a reference to "an internet connection" would suggest to a POSITA that the internet connection must be used to provide additional memory. By that logic, Mooring could likewise use an internet connection for the same purpose, as Mooring likewise has an internet connection. *Mooring*, 0070. ("Thereafter, the modular movement 12 b streams stocks, weather and the like for the user via an Internet connection made using the RF communications interface 610.")

54. In addition, as discussed above, the memory and computationally intensive elements of the application, according to Satoshi, included real-time gear animations and image data for different colored gears, which are not required by the '033 Patent claims or the proposed combination of Satoshi and Mooring.

55. A POSITA would also note that the entire image application of Satoshi is designed for “extremely limited image data storage capacity” and “extremely limited program stores capacity[.]” *Satoshi*, [0080]. Accordingly, a POSITA would have appreciated that Satoshi’s application had been designed to take up a small, limited amount of storage. In light of these express disclosures of Satoshi, I specifically disagree with Mr. Blackadar’s assumption that “the code size” of Satoshi’s “Java implementation would be enormous.”

56. I also considered Mr. Blackadar’s conclusion that “a POSITA would have realized that a Java implementation utilizing the Internet as memory to ‘display[] an animation of interactively operable gears of any number for mobile phone users’ would be impossible.” Ex-1007, ¶57. As noted above, this argument misrepresents Satoshi, which never describes “utilizing the Internet as memory.” Further, I see nothing in the claims of the '033 patent requiring “an animation of interactively operable gears of any number” and for at least that reason Mr. Blackadar’s argument, true or not, has nothing to do with a motivation to make the proposed combination.

57. Finally, Mr. Blackadar's claim that I ignored "the differing size and power capabilities of microcontrollers between mobile phones and wristwatches as of the date of the '033 Patent invention is incorrect for the same reasons discussed above. Ex-2004, ¶58.

58. For these reasons, even after considering the points raised by Mr. Blackadar it is my opinion that a POSITA would have been motivated to combine Mooring and Satoshi as disclosed in the Petition.

**V. THE COMBINATION OF MOORING AND SATOSHI DISCLOSES "A MICROCONTROLLER BEING ARRANGED FOR REPRODUCING ON SAID ELECTRONIC DISPLAY THE SIMULATION OF A MECHANICAL WATCH MOVEMENT."**

59. I considered the arguments raised by Patent Owner and Mr. Blackadar regarding whether Mooring discloses any "simulation of a mechanical watch movement" and nothing in their arguments changes my opinions.

60. As I originally opined, from the disclosures of Paragraph 39, a POSITA would have understood that "Mooring describes an embodiment that includes an analog display in which the microcontroller displays on the touchscreen a simulation of the movement of hour and minute hands to indicate the time." Ex-1002, ¶150; *Petition*, 31-32.

Examples of an electronic movement may include a quartz movement with an analog or digital display, and with or without a battery. Another

example of an electronic movement may include a computer-based movement with a touchscreen or LCD display and battery, for instance.

*Mooring*, [0039].

61. Accordingly, *Mooring* discloses an analog display (i.e. hour and minute hands) and that the movement of those hour and minute hands may be a computer-based movement simulated on a touchscreen, similarly to the actual mechanical hour and minute hands depicted in Figure 1A's mechanical movement. *Petition*, 31-32.

62. I further note that Patent Owner does not dispute that Satoshi teaches “display[ing] watch hands[.]” *Petition*, 34. The *Petition* argues that “it would have been obvious to a POSITA **to implement the watch face and gears of Satoshi in the electronic display of the wristwatch of Mooring.**” *Id.* For this additional reason, the proposed combination satisfies the “simulation of mechanical watch movement” limitation.

## VI. CONCLUSION

63. For the reasons set forth above and in the declaration I previously provided in this proceeding (Ex-1002), it remains my opinion that Claims 1-19 of the '033 Patent are unpatentable in view of the prior art.

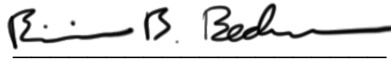
64. In signing this declaration, I recognize that it will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-

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.

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

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

Respectfully submitted,

  
Benjamin B. Bederson

Date: November 11, 2024