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Paper 84
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ABB INC.
Petitioner

v.

ROY-G-BIV CORPORATION
Patent Owner

Cases IPR2013-00062 & IPR2013-00282
Patent 6,516,236 B1

Before THOMAS L. GIANNETTI, JENNIFER S. BISK, and JEREMY M. PLENZLER, *Administrative Patent Judges*.

GIANNETTI, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

A. Background

ABB Inc. ("Petitioner") filed a Petition requesting an *inter partes* review of claims 1-10 of U.S. Patent No. 6,516,236 B1 (Ex. 1001 ("the '236 patent")). Paper 4.[1] On April 18, 2013, the Board instituted trial on claims 1-4 and 8-10. Paper 23. On May 17, 2013, Petitioner filed a second Petition requesting an *inter partes* review of claims 1-10 of the '236 patent. IPR2013-00282, Paper 1. With the second Petition, Petitioner filed a motion requesting joinder with IPR2013-00062. IPR2013-00282, Paper 4. On June 10, 2013, Petitioner filed a motion limiting its second Petition to claims 5-7. IPR2013-00282, Paper 11. On August 9, 2013, the Board granted the second Petition and instituted a trial as to claims 5-7. IPR2013-00282, Paper 14. On the same day, the Board granted the motion for joinder and joined IPR2013-00062 and IPR2013-00282. IPR2013-00282, Paper 15.

During trial, ROY-G-BIV Corp. ("Patent Owner") filed a Patent Owner Response ("PO Resp.") addressing the challenges from the first Petition and a Supplemental Patent Owner Response ("Supp. PO Resp.") addressing the challenges from the second Petition. Papers 30, 32. The Patent Owner Response was accompanied by an expert declaration from David B. Stewart, Ph.D. (Ex. 2011), author of the Stewart thesis relied upon by Petitioner. Petitioner filed a Reply ("Pet. Reply") and, for the first time in this proceeding, presented expert testimony, namely declarations from Richard Voyles, Ph.D. (Ex. 1130) and Nikolaos Papanikolopoulos, Ph.D. (Ex. 1132). Paper 44. Drs. Voyles and Papanikolopoulos worked in the

[1] Citations to the record refer to IPR2013-00062 unless otherwise noted.

same laboratory at Carnegie Mellon University as Dr. Stewart, and their testimony was presented by Petitioner to rebut Dr. Stewart's expert testimony. Patent Owner also filed a motion to exclude evidence ("Mot."). Paper 59. Oral hearing was held on January 23, 2014. A transcript of the hearing is included in the record as Paper 76 ("Transcript").

We have jurisdiction under 35 U.S.C. § 6(c). This final written decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons discussed below, we determine that Petitioner has not met its burden to prove by a preponderance of the evidence that claims 1-10 of the '236 patent are unpatentable.

B. The '236 Patent

The '236 patent relates generally to a system that facilitates the creation of hardware-independent motion control software. Ex. 1001, col. 1, ll. 13-16. In particular, the patent describes a high-level motion control application programming interface ("API") made of functions that are correlated with driver functions associated with controlling a mechanical system that generates movement based on a control signal. *See generally id.* at col. 1, ll. 5-49. The object of the invention is to isolate the application programmer from the complexity of hardware devices, which often have a manufacturer-specific motion control command language and functionality that is highly hardware-dependent. *See generally id.* at col. 3, ll. 24-42. At the same time, the API allows the programmer to access base motion operations of the hardware device. *Id.*

As described in the '236 patent, the prior art includes a number of low-level software programs for directly programming individual motion control devices, or for aiding in the development of systems containing a

number of motion control devices. *Id.* at col. 1, l. 55 – col. 2, l. 34. While providing complete control over the hardware, these low-level programs are highly hardware-dependent. *Id.* In describing the invention, the '236 patent discloses a programming interface consisting of "component functions" containing code that relates to driver functions, which in turn are associated with, or contain code for, implementing the motion steps on a given motion control device. *Id.* at col. 3, ll. 56-66. The component functions support both core driver functions—those functions that must be supported by all software drivers—and extended driver functions—those functions that may, or may not be, supported by a particular software driver. *Id.* at col. 4, ll. 3-13. When feasible, component functions can emulate extended driver functions not supported by a particular device by using a combination of core driver functions. *Id.* at col. 4, ll. 25-44.

C. Illustrative Claim

Claim 1, the only independent claim, is reproduced below:

> 1. A system for generating a sequence of control commands for controlling a selected motion control device selected from a group of supported motion control devices, comprising:
>
> a set of motion control operations, where each motion control operation is either a primitive operation the implementation of which is required to operate motion control devices and cannot be simulated using other motion control operations or a non-primitive operation that does not meet the definition of a primitive operation;
>
> a core set of core driver functions, where each core driver function is associated with one of the primitive operations;
>
> an extended set of extended driver functions, where each extended driver function is associated with one of the non-primitive operations;

a set of component functions;

component code associated with each of the component functions, where the component code associates at least some of the component functions with at least some of the driver functions;

a set of software drivers, where

each software driver is associated with one motion control device in the group of supported motion control devices,

each software driver comprises driver code for implementing the motion control operations associated with at least some of the driver functions, and

one of the software drivers in the set of software drivers is a selected software driver, where the selected software driver is the software driver associated with the selected motion control device;

an application program comprising a series of component functions, where the application program defines the steps for operating motion control devices in a desired manner; and

a motion control component for generating the sequence of control commands for controlling the selected motion control device based on the component functions of the application program, the component code associated with the component functions, and the driver code associated with the selected software driver.

D. The Prior Art References Supporting the Alleged Unpatentability of Claims 1-10

The following references are relied upon by Petitioner:

Gertz	Matthew Wayne Gertz, A Visual Programming Environment for Real-Time Control Systems (Ph.D. dissertation, Carnegie Mellon University)	Nov. 22, 1994	Ex. 1002

Stewart	David Bernard Stewart, Real-Time Software Design and Analysis of Reconfigurable Multi-Sensor Based Systems (Ph.D. dissertation, Carnegie Mellon University)	Apr. 1, 1994	Ex. 1004
Morrow	J. Dan Morrow, Bradley J. Nelson & Pradeep Khosla, *Vision and Force Driven Sensorimotor Primitives for Robotic Assembly Skills*, INST. FOR SOFTWARE RES., paper 574	Jan. 1, 1995	Ex. 1005
DDAG	MICROSOFT CORP., MICROSOFT WINDOWS VERSION 3.1 DEVICE DRIVER ADAPTION GUIDE, chs. 1-2, 4, 10-12	1991	Ex. 1006
Brockschmidt	KRAIG BROCKSCHMIDT, INSIDE OLE 2	1994	Ex. 1011[2]
HP86	HEWLETT-PACKARD CO., INTERFACING AND PROGRAMMING MANUAL, HP 7550A GRAPHICS PLOTTER (3rd ed.)	1986	Ex. 1019

E. The Pending Grounds of Unpatentability Against Claims 1-10

The following challenges to patentability under 35 U.S.C. § 103 were considered:

References	Claims
Gertz, Stewart, and Morrow	1-4 and 8-10
Gertz, Stewart, Morrow, DDAG, and Brockschmidt	5-7
Gertz, Stewart, Morrow, DDAG, and HP86	5-7

II. DISCUSSION

A. Antedating Gertz and Morrow

1. Background

Gertz is dated November 22, 1994 and Morrow is dated January 1, 1995. PO Resp. 6. Patent Owner does not challenge these dates of publication. Instead, Patent Owner contends that the claimed invention of

[2] Exhibit number from IPR2013-00282.

the ’236 patent was conceived prior to the earliest publication date for the references, namely November 22, 1994, and constructively reduced to practice on May 30, 1995, the filing date of the “priority application” (serial no. 08/454,736) that led to the ’236 patent. PO Resp. 6-7. Patent Owner further contends that the inventors were reasonably diligent from November 21, 1994, to the date of the constructive reduction to practice. *Id.* Patent Owner contends that, as a consequence, neither Gertz nor Morrow qualifies as prior art. *See* 35 U.S.C. § 102(g) (2011); *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1576 (Fed. Cir. 1996) (“Thus, under section 102(a), a document is prior art only when published before the invention date.”).

For support, Patent Owner relies on the declaration testimony of its founder, chairman, and chief technical officer, David W. Brown, who also is named as a co-inventor on the ’236 patent. PO Resp. 6-7; Ex. 2010 ¶¶ 1-4. Mr. Brown testifies that he and his co-inventor conceived of the subject matter claimed in the ’236 patent prior to November 21, 1994. Ex. 2010 ¶ 7.

In support of Mr. Brown’s testimony regarding conception, Patent Owner proffers two draft specification documents (Ex. 2010-1; Ex. 2010-2). Mr. Brown testifies that he and his co-inventor prepared these documents by July 24, 1994, in connection with their work on the XMC motion control software development project (the “XMC project”) that led to the ’236 patent. Ex. 2010 ¶ 9. The XMC project was Mr. Brown’s primary responsibility throughout the 1994 and 1995 timeframe. Ex. 2010 ¶ 8.

To show diligence, Patent Owner relies upon time logs prepared by Mr. Brown relating to his activities on the XMC project from November 20, 1994, to May 30, 1995, and in July 1994 (Ex. 2010-3; Ex. 2010-6), and Mr. Brown’s testimony summarizing the time logs. PO Resp. 10-12; Ex. 2010

¶¶ 20-21. To show constructive reduction to practice, Patent Owner relies on the "priority application" filed on May 30, 1995, that led to the issuance of the '236 patent. PO Resp. 10; Ex. 2010-5. Mr. Brown's declaration also includes an additional exhibit, a software specification dated February 22, 1995 (Ex. 2010-4), portions of which, Mr. Brown testifies, were filed with the USPTO as an appendix to that application. Ex. 2010 ¶ 6. Mr. Brown refers to this software specification, which he also authored, briefly in his testimony. *Id.* ¶ 20.

Mr. Brown's testimony on diligence is contained in a section of his declaration headed "Time Logs Evidence of Diligence in Reduction to Practice." In this section, Mr. Brown summarizes his "major activities" on the XMC project on a weekly basis. *Id.* ¶ 20. According to Mr. Brown, these summaries "reference to my time logs attached as Exhibits 2010-3 through 2010-6." *Id.* The time logs will be discussed further below.

Petitioner responds, first, by challenging Patent Owner's conception proofs. Pet. Reply 3. According to Petitioner, Patent Owner fails to "link[]" elements of certain claims (claims 5-7) to the proffered conception documents, and "admit[s]" that claim 10 is entitled to a May 30, 1996, effective filing date. *Id.* Second, Petitioner challenges Patent Owner's corroborating evidence, particularly as it relates to diligence. *Id.* at 4-8. Petitioner asserts that Mr. Brown's time records are unreliable for a variety of reasons, including the failure to provide independent corroborating evidence. *Id.* at 1-2. Petitioner also points to diligence "gaps," for example, the holiday period of December 21, 1994 to January 3, 1995, during which Mr. Brown's time records do not reflect work on the XMC project. *Id.* at 6.

2. Discussion

The oral testimony of an inventor, standing alone, is insufficient to prove conception. *Mahurkar*, 79 F.3d at 1577; *Price v. Symsek*, 988 F.2d 1187, 1194 (Fed. Cir. 1993). "It has long been the case that an inventor's allegations of early invention alone are insufficient—an alleged date of invention must be corroborated." *In re NTP, Inc.*, 654 F.3d 1279, 1291 (Fed. Cir. 2011). As explained by the Federal Circuit in *Mahurkar*, the requirement arose out of concern that inventors testifying in patent infringement cases would be tempted to remember facts favorable to their case "by the lure of protecting their patent or defeating another's patent." 79 F.3d at 1577. The corroboration requirement is not limited to conception. It applies also to inventor testimony regarding diligence and reduction to practice. *Price*, 988 F.2d at 1196. Here, Patent Owner relies on the filing of an application as a constructive reduction to practice, and there is no dispute concerning that date. However, corroboration is required for the testimony provided by Mr. Brown on conception and diligence.

Corroboration evidence must be independent of the inventor. Independent corroboration may consist of testimony of a witness, other than the inventor, or it may consist of evidence of surrounding facts and circumstances, independent of information received from the inventor. *Reese v. Hurst*, 661 F.2d 1222, 1225 (CCPA 1981); *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1170 (Fed. Cir. 2006) ("The requirement of independent knowledge remains key to the corroboration inquiry."). As Patent Owner recognizes, corroboration is determined under a "rule of reason" analysis. *Price*, 988 F.2d at 1195. "An evaluation of *all* pertinent evidence must be made so that a sound determination of the credibility of the

inventor's story may be reached." *Id.* However, "[t]he rule of reason . . . does not dispense with the requirement for some evidence of independent corroboration." *Coleman v. Dines*, 754 F.2d 353, 360 (Fed. Cir. 1985).

Price sets forth a set of factors that may bear on the inventor's credibility and whether the inventor's testimony has been corroborated adequately. 988 F.2d at 1195 n.3. These include: (1) delay between the event and the trial; and (2) interest of the corroborating witnesses. In *Mahurkar*, for example, the corroborating evidence included disclosure of the invention to third parties, who provided testimony and correspondence acknowledging receipt of, and describing prototypes of, the invention. 79 F.3d at 1578-79.

The only evidence of diligence is Mr. Brown's testimony and documents. As required by *Price*, in assessing the need for corroboration of inventor testimony, we look at the record, as a whole, under the rule of reason. Time delay to the event in question is one factor. We note that the events in question took place over 20 years ago, a fact mentioned several times by Mr. Brown during his deposition testimony when he could not recall the answer to a question. Ex. 1129, 20:22; 39:20; 44:2; 90:14. We note also the diligence period required to antedate both references is over six months. Finally, we note the exceedingly high interest level of Mr. Brown (as inventor, founder, and CTO of Patent Owner) in the outcome.

The cases relied on by Patent Owner support the conclusion that we must require more than the inventor's own records for corroboration of his testimony. For example, in *Sandt Technology, Ltd. v. Resco Metal & Plastics Corp.*, 264 F.3d 1344 (Fed. Cir. 2001), the corroborating evidence included a letter to a third party in response to a request for proposals, an

affidavit from a third party attesting to a demonstration, and invoices for purchases of equipment. In *Brown v. Barbacid*, 436 F.3d 1376 (Fed. Cir. 2006), the corroborating evidence included evidence of laboratory work performed by a scientist working in the same laboratory as the inventor. In *Scott v. Koyama*, 281 F.3d 1243, 1244 (Fed. Cir. 2002), a full written description of the invention was disclosed to others besides the inventors. Also, the diligence requirement in that case was only 17 days, and the inventor provided evidence of daily activities progressing toward building a plant to practice the process at issue. *Id.* at 1247-48. Patent Owner points to *Scott* as a case in which an inventor's own records were sufficient corroboration. Transcript 31-32. We see no discussion of that in the decision, for the diligence issue there turned instead on the nature of the activities, not corroboration. *Scott*, 281 F.3d at 1247. In fact, the nature of the activities (described as "focused on selection of the construction company") suggests that more than the inventor's own activities were involved.[3] *Id.* Finally, in *Ohio Willow Wood Co. v. Alps South, LLC*, 735 F.3d 1333 (Fed. Cir. 2013), the corroborating evidence included witness testimony, documents, and physical samples.[4]

Especially considering the high degree of Mr. Brown's interest in the outcome of the case and other factors discussed, we find the evidence of

[3] The activities are described as "manifested by oral or written communications." *Scott*, 281 F.3d at 1248.

[4] Patent Owner's reliance (Transcript 24) on the Board's final decision in *Garmin International, Inc. v. Cuozzo Speed Technologies LLC*, IPR2012-00001, Paper 59 (Nov. 13, 2013) is misplaced. There, the patent owner did not succeed in establishing prior invention for failure to present independent corroboration of conception and persuasive evidence of diligence.

diligence presented by Patent Owner to be insufficient. As Patent Owner admitted at oral argument, none of the proffered corroboration is independent of Mr. Brown. Transcript 27. Moreover, the time records relied on do not stand by themselves, requiring explanation by Mr. Brown's testimony to be comprehensible. In that respect, they are like the inventor testimony rejected by the Board in *NTP*. There, in affirming the Board, the Federal Circuit remarked: "It would be strange indeed to say that [the inventor], who filed the R.131 affidavit that needs corroborating, can by his own testimony provide that corroboration." *NTP*, 654 F.3d at 1292.

Over a month after the final oral hearing, Patent Owner, after receiving Board authorization, filed a motion to submit supplemental information on the issue of conception. Paper 78. In view of the lateness of the request, the Board asked that the proffered supplemental information be submitted with the motion. This information consists of a transcript of the deposition of Marc McClung and exhibits. Ex 2021. The deposition was taken by Petitioner in the parallel district court action. According to Patent Owner, the McClung testimony "provides independent corroboration of key conception evidence, *i.e.*, the 7/24/1994 RGB Design Spec., McClung Ex. 5, Ex. 2010-1 (2nd RGB Spec.)." Paper 78, 2. Petitioner opposes the motion, citing prejudice due to the lateness of the submission. Paper 83, 1. Petitioner also contends that Mr. McClung is an "unnamed co-inventor" who, therefore, cannot provide independent corroboration. *Id*. at 4. Petitioner also points out that the McClung testimony does not corroborate the alleged diligence, which is a separate independent requirement. *Id*. at 5.

We are not persuaded by Petitioner's claim of prejudice. It appears that Petitioner held off noticing Mr. McClung's deposition until the day after

the final oral hearing in related proceeding IPR2013-00063, suggesting strategic delay. Paper 78, 1. However, we do agree with Petitioner that Mr. McClung's testimony does not provide independent corroboration of diligence, which is required as discussed above. In view of our determination that Patent Owner has not proved diligence, we do not need to determine whether Patent Owner adequately demonstrated conception, and therefore do not need to reach the issues raised by Patent Owner's motion and Petitioner's opposition. We conclude, therefore, that Patent Owner has not antedated Gertz and Morrow; therefore, these references are prior art under 35 U.S.C. § 102(a).

B. Claim Construction

Consistent with the statute and the legislative history of the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011), the Board will interpret claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent. 37 C.F.R. § 42.100(b); *see also* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012). Claims are to be given their broadest reasonable interpretation consistent with the specification, reading the claim in light of the specification, as it would be interpreted by one of ordinary skill in the art. *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004).

For purposes of this decision, we expressly construe only the terms "component function" and "component code," as these terms are determinative. We, therefore, do not reach the dispute over "primitive operations." *See* Transcript 37-38. Nor do we need to resolve the dispute over "function." Transcript 41-46. At the oral hearing, Patent Owner agreed

that its application of the prior art to the claims does not depend on which definition of the term "function" is applied, as discussed below. Transcript 37, 41-42.

1. "component function"

The parties present opposing views on the construction of "component function." Patent Owner proposes that the term "function" in "component function" requires code that can be executed within a program. Ex. 2018, 36-37. Petitioner argues that executable code is not required. Pet. Reply 9. Instead, Petitioner proposes that the term "function" includes "'in-line' functions, constructs in scripting languages, interpreted languages, and also visual programming constructs, regardless of how the program is stored or executed." *Id.* at 10 (citing Ex. 1130 ¶¶ 39, 42-46).

Neither party points to a special meaning in the patent specification. Patent Owner cites to the MICROSOFT COMPUTER DICTIONARY for the plain meaning of "function." Transcript 41-42; Ex. 2018, 36 (citing Ex. 2016, 212).[5] The MICROSOFT COMPUTER DICTIONARY provides two definitions for the term "function": "1. The purpose of, or the action carried out by, a program or routine"; and "2. A general term for subroutine." Ex 2016, 4. Neither definition requires executable code. However, the first, broader definition requires an "action carried out by[] a program or routine." Thus, we conclude that the broadest reasonable interpretation of the term "component function" requires an action carried out by a program or routine,

[5] Exhibit 2016 includes portions of the MICROSOFT COMPUTER DICTIONARY (3rd ed.), which was published in 1997. This is close enough in time to the May 30, 1995, effective filing date of the '236 patent to provide guidance for the terms used in the '236 patent.

regardless of whether the action is defined by executable code. This is consistent with the specification of the '236 patent, which explains that "[t]he application program 26 comprises a sequence of component functions arranged to define the motion control operations necessary to control a motion control device to move an object in a desired manner." Ex. 1001, col. 8, ll. 26-30.

2. "component code"

Petitioner proposes that "component code is computer code which associates at least some of the component functions with at least some of the driver functions." Pet. 22. According to Petitioner, this does not require a formal computer language, but rather only requires some "form of control flow, including visual programming constructs." Pet. Reply 9. Patent Owner contends that even if "component code" does not require a formal language, it still requires some form of code. PO Resp. 20.

We agree with Petitioner that a formal computer language is not required. However, we also agree with Patent Owner that "component code" requires some form of "code," as the word "code" is recited explicitly by this limitation. The MICROSOFT COMPUTER DICTIONARY defines "code" as "[p]rogram instructions." Ex. 2016, 2. We, therefore, determine that, applying the broadest reasonable interpretation of the term "component code," program instructions are required to meet the limitation. This is consistent with the specification of the '236 patent, which explains that "the software system designer writes component code that associates at least some of the component functions with at least some of the driver functions." Ex. 1001, col. 7, ll. 56-59.

C. Summary of Expert Testimony

Three experts—all Ph.D.s from the same university laboratory—testified in this case. As noted, Petitioner initially presented no expert testimony. With its post-institution response, however, Patent Owner presented the testimony of David Stewart, Ph.D., author of the Stewart reference. Petitioner then presented, with its reply, the testimony of two rebuttal experts: Richard Voyles, Ph.D.; and Nikolaos Papanikolopoulos, Ph.D.

For the reasons that follow, we credit Dr. Stewart's testimony that certain elements in the patent claims are not present in the prior art relied on by Petitioner.

1. Dr. Stewart's Testimony

As noted, Dr. Stewart is the author of the Stewart reference. Ex. 2011 ¶ 2. He also co-authored publications with Dr. Gertz, author of the Gertz reference. *Id.* Dr. Stewart has over 25 years of professional experience in software. *Id.* ¶ 4. He earned his Ph.D. in computer engineering from Carnegie Mellon University in 1994. *Id.* ¶ 5. His Ph.D. dissertation is the Stewart reference relied upon by Petitioner. *Id.*

Dr. Stewart testifies that he is "very familiar" with the Gertz reference in addition to his own thesis, the Stewart reference. *Id.* ¶ 7. He knows Dr. Gertz personally and worked with him at Carnegie Mellon. *Id.* He further testifies that Dr. Gertz's work built upon his own work. *Id.* ¶ 8.

According to Dr. Stewart, robotics research in the early 1990s had solved the problems of robot movement. *Id.* ¶ 9. There was tremendous difficulty, however, with creating more sophisticated systems that included many sensors to provide feedback on the surrounding environment so that

multiple robots could coordinate with one another. *Id.* The Stewart reference was an extension to a prior design on a real-time operating system known as Chimera, to improve the programmability of such robotic systems. *Id.* Dr. Stewart created Chimera as part of his Master's thesis work. *Id.*

The Stewart reference is focused on operating system functionality, and was intentionally designed to be independent of any robotic application. *Id.* This reference discloses the port-based object, which Dr. Stewart describes as an architectural concept that was achieved by combining the use of objects with port automata theory. *Id.* ¶ 10. Dr. Stewart explains that the main components of port-based objects are ports and functions. *Id.* ¶ 11. He describes the ports as being used for exchanging data with other objects and the functions as representing the encapsulation of code that needs to be executed at specific times. *Id.*

Dr. Stewart further testifies that the Stewart reference discloses control modules and control tasks. *Id.* ¶ 12. He describes a control module as the source code or compiled binary code of the functions needed by the port-based object and the specification of its input and output ports. *Id.* He describes a control task as a control module executing on the target platform. *Id.*

To summarize, Dr. Stewart testifies that the Stewart reference discloses a programming environment that has a port-based object model at its core, which targets the implication of dynamic and real-time multi-sensor and multi-actuator systems in a multiprocessor environment. *Id.* ¶ 16. He characterizes the Stewart reference as describing a system that is independent of the application, and even though it has been applied

primarily to robotics control systems, there is nothing defined within the architecture that is robotics-specific. *Id.*

Dr. Stewart's testimony also summarizes the Gertz and Morrow references. *Id.* ¶¶ 17-25. According to Dr. Stewart, the Gertz reference attempted to bring visual programming to the port-based object system Dr. Stewart had developed. *Id.* ¶ 17. The Gertz reference describes a "visual programming environment" called Onika. *Id.* ¶ 18. The Onika system made available to users a library of control modules. *Id.* Each such module was associated with a file containing various parameters. *Id.* This file was called a control task. *Id.* A control task was the most basic building block available to the users of Onika. *Id.*

Dr. Stewart testifies that the Gertz reference discloses graphical representations of control tasks based on Chimera's port-based objects. *Id.* ¶ 19. Configurations in Onika were combinations of control tasks. *Id.* ¶ 20. The final product of Onika was a "configuration file" that could be downloaded to a computer system running Chimera. *Id.* ¶ 21. To summarize, Dr. Stewart testifies that Onika was a visual programming environment executing on the developer's computer that enabled users to create a complex configuration file from a library of pre-existing control modules on the target motion control computer. *Id.* ¶ 22. He explains that when that complex configuration file was used on the target motion control computer, the only code executing on that computer was the code in the pre-existing control modules. *Id.* Dr. Stewart describes the Morrow reference as leveraging the Stewart reference's work by adding applications-specific capability for robotics. *Id.* ¶ 23.

Dr. Stewart's testimony takes issue with Petitioner's analysis of the Stewart and Gertz references in several respects. *Id.* ¶¶ 29-47. Specifically, he testifies that the references are lacking at least four elements of the patent claims: (1) component function; (2) core driver function; (3) extended driver function; and (4) component code. *Id.* ¶ 29. Dr. Stewart explains the "actions" in Gertz are not component functions, and the "configurations" and "tasks" in Gertz are not driver functions. *Id.* ¶¶ 40-41. Furthermore, he testifies that there is no "code" in Onika relating "actions" to "configurations" and "control tasks." *Id.* ¶¶ 43-44. He explains that this is because Onika only produces configuration information that cannot be characterized as software code. *Id.* ¶ 44.

We have reviewed Dr. Stewart's testimony and supporting evidence, and the rebuttal evidence presented by Petitioner (discussed further below), and conclude that this testimony is persuasive insofar as it relates to deficiencies in the prior art relied on by Petitioner. Petitioner identifies the Gertz reference's "actions" as component functions. Pet. 22; Transcript 15. However, as Dr. Stewart points out, these actions are represented by configuration files, which are groupings of control tasks within Chimera. Ex. 2011 ¶ 40. Similarly, Dr. Stewart testifies that the Gertz reference's Onika only contains configuration information, and does not contain component code, as contended by Petitioner. *Id.* ¶ 44.

2. Dr. Voyles's Testimony

Dr. Voyles received his Ph.D. in robotics from Carnegie Mellon University in 1997. Ex. 1130 ¶ 2. He worked in the same lab at Carnegie Mellon as Drs. Stewart, Gertz, Morrow, and Papanikolopoulos. *Id.* ¶ 13. He

testifies that he worked extensively with Onika while at Carnegie Mellon. *Id.* ¶ 3.

Dr. Voyles's testimony is directed mainly to the motivation for combining the Gertz and Morrow references (*id.* ¶ 18) and to the meaning of "primitive" (*id.* ¶¶ 23-34). He does not directly address the issue of whether the Gertz reference's "actions" are component functions in his declaration. He does not provide a definition of software code, but nevertheless addresses the issue of whether configuration files are software code by referring to the Jacquard Loom and other examples. *Id.* ¶¶ 42-44. Instead of directly stating his opinion on that issue, he opines that "I feel it is far too restrictive to a person of ordinary skill to say there is a distinction between 'software code' and 'downloaded configuration files' in reference to that which Onika produces." *Id.* ¶ 44. This analysis is neither persuasive nor consistent with the patent specification.

On cross-examination, Dr. Voyles was presented with a list of his disagreements with Dr. Stewart, prepared by Patent Owner's counsel. Ex. 2020. With changes that he entered at the deposition, Dr. Voyles testified that the list was an accurate summary. Ex. 2013, 134:25–135:9. Dr. Voyles's summary did not list the four claim elements Dr. Stewart testifies are missing from the references, and he does not directly address them in his testimony. We are not convinced that Dr. Voyles's rebuttal testimony supports a conclusion that Dr. Stewart's testimony on those issues should not be credited.

3. Dr. Papanikolopoulos's Testimony

Dr. Papanikolopoulos also received his Ph.D. from Carnegie Mellon University. His degree was in electrical and computer engineering. Ex. 1132 ¶ 2.

With respect to the Gertz reference, Dr. Papanikolopoulos testifies that Dr. Stewart "ignored several features that are relevant to the patentability of the claims." *Id.* ¶ 53. For example, Dr. Papanikolopoulos takes issue with Dr. Stewart's testimony that Onika is "only" a visual programming language based upon configuration files, characterizing the testimony as "inaccurate[]." *Id.* ¶ 55. He does not dispute, however, Dr. Stewart's description of these visual programming "capabilities" of Onika. *Id.* He identifies the Gertz reference's "tasks" with "core driver functions." *Id.* ¶ 61. He disputes that Onika communicates with Chimera using configuration files that have to be downloaded. *Id.* ¶ 64. He disputes that Onika and Chimera can only be run on the same computer system. *Id.* ¶ 67. He concludes that "Gertz clearly describes creating and executing programs." *Id.* ¶ 72.

He does not, however, directly address Dr. Stewart's assertion that the Gertz reference's "actions" are not component functions. Nor does he directly address the assertion that the Gertz reference lacks a teaching of component functions. When asked for his understanding of the term "code" at his deposition, he provided inconclusive and unhelpful testimony. Ex. 2014, 35:9–37:10. We are not persuaded by Dr. Papanikolopoulos's rebuttal testimony that Dr. Stewart's testimony on these issues should not be credited.

D. Obviousness Ground Based on Gertz, Stewart, and Morrow

Petitioner challenges claims 1-4 and 8-10 as being unpatentable under 35 U.S.C. § 103(a) based on the combination of Gertz, Stewart, and Morrow. Claims 2-4 and 8-10 depend, either directly or indirectly, from claim 1.

For the reasons set forth above, we give significant weight to the testimony of Patent Owner's expert, Dr. Stewart, that actions in Gertz are not the same as the claimed component functions, and that Gertz does not describe any code (i.e., the claimed component code) that associates component functions with driver functions, as claimed. Petitioner does not provide sufficient evidence to rebut this testimony, and we reject Petitioner's attempt to discredit Dr. Stewart through the direct testimony of Drs. Voyles and Papanikolopoulos. On cross-examination, Dr. Voyles admitted that Dr. Stewart is an intelligent man and a reliable computer scientist. Ex. 2013, 38:5-10. Dr. Voyles also testified that he holds Dr. Stewart in high regard as a software engineer. *Id.* at 38:16-21. Dr. Papanikolopoulos testified he has submitted "multiple" letters of recommendation for Dr. Stewart. Ex. 2014, 62:20-23. Thus, as described in detail below, we are not persuaded that Petitioner has established, by a preponderance of the evidence, that the combination of Gertz, Stewart, and Morrow renders claims 1-4 and 8-10 unpatentable under 35 U.S.C. § 103(a).

Petitioner's challenge to the patentability of claim 1 relies on Gertz, alone, for the claimed component function and component code features. Pet. 22-23; Pet. Reply 13. Stewart and Morrow are relied upon for additional features of the claims. Because Petitioner's challenge fails with respect to the component function and component code features of the

claims, we do not need to address issues regarding Stewart and Morrow. Therefore, the discussion below focuses on Gertz.

1. "component function"

Petitioner relies on Gertz's "actions" to meet this claim limitation. Pet. 22; Transcript 15. Patent Owner contends that Gertz's "actions" are not component functions. PO Resp. 26 (citing Ex. 2011 ¶ 40). We agree with Patent Owner.

Gertz's "actions" are configuration files for use by a program or routine regarding the arrangement of control tasks. Ex. 2011 ¶ 40. They are not "actions carried out by a program or routine," as required by our construction of "component function." Dr. Stewart testifies that "configuration files . . . abstract a grouping of control tasks." *Id.* The configuration files define how the control tasks (i.e., the control modules that actually carry out the activity) are arranged. Petitioner does not point to anything in Gertz, the testimony of Dr. Voyles, or the testimony of Dr. Papanikolopoulos to rebut Dr. Stewart's testimony regarding the configuration files that form the actions in Gertz, or explain why the configuration files in Gertz define an "action carried out by a program or routine."

For these reasons, Petitioner has not explained persuasively why information regarding the arrangement of control tasks defines an "action carried out by a program or routine," as required by a component function. Thus, Petitioner has not established, by a preponderance of the evidence, that Gertz teaches the claimed component functions.

2. "component code"

Petitioner does not point to any specific element or feature disclosed in Gertz as teaching the claimed component code. Instead, Petitioner explains that "ordinary artisans would recognize . . . that the configuration files that [Gertz] creates comprise software code that binds various components together into a programming sequence (including Turing equivalents) that have been the basis of computer programming for over a century." Pet. Reply 13 (citing Ex. 1030 ¶¶ 37-39, 42-46).[6] We are not convinced that this argument is supported by the record. Dr. Voyles asserts that Gertz discloses the claimed component code because "the 'visual programs' created by Onika would be considered examples of both 'computer code' and 'software code.'" Ex. 1130 ¶ 39. However, Dr. Voyles offers no explanation as to why the visual programs in Gertz are anything more than configuration files.[7] Instead, Dr. Voyles asserts (without any evidentiary support) that one of ordinary skill in the art would see no distinction "between 'software code' and 'downloaded configuration files.'" *Id.* ¶ 44.

Patent Owner responds that Gertz's configuration files do not connect the control tasks and configurations to actions using code. PO Resp. 28-29 (citing Ex. 2011 ¶ 44). We find this argument persuasive. We credit Dr. Stewart's testimony explaining that "there is no 'code' in Onika relating 'actions' to 'configurations' and 'control tasks'" because "Onika only

[6] It appears that Petitioner's citation should be to Exhibit 1130 rather than Exhibit 1030.

[7] Neither the Petition nor the Reply relies on any testimony of Dr. Papanikolopoulos with respect to Gertz's alleged teaching of component code.

produces configuration information." Ex. 2011 ¶ 44. Dr. Stewart testifies that configuration information is not software code. *Id.*

We have determined that "code" requires program instructions. The MICROSOFT COMPUTER DICTIONARY defines "instruction" as "[a]n action statement in any computer language, most often in machine or assembly language." Ex. 2016, 5. Petitioner cites Dr. Voyles's opinion that the visual programs created in Onika are an example of code. Pet. Reply 13 (citing Ex. 1030 ¶¶ 37-39, 42-46).[8] We are not persuaded by this testimony. Neither Petitioner nor Petitioner's experts persuasively rebut Dr. Stewart's testimony, or explain why the configuration information in Gertz includes any kind of "action statement in a computer language," as required by our construction of component code. Petitioner points to nothing in Gertz that teaches or suggests that the claimed component code would have been obvious. *See* Transcript 59-60. In view of the testimony of Dr. Stewart, and based on our review of Gertz, we are not persuaded that the configuration information in Gertz includes an "action statement in a computer language." Thus, Petitioner has not established, by a preponderance of the evidence, that Gertz teaches or suggests the claimed component code.

Petitioner's challenge with respect to dependent claims 2-4 and 8-10 fails for the reasons set forth regarding claim 1.

E. Obviousness Ground Based on Gertz, Stewart, Morrow, DDAG, and Brockschmidt

Claims 5-7 depend, either directly or indirectly, from claim 1 and, therefore, include the "component function" and "component code"

[8] It appears that Petitioner's citation should be to Exhibit 1130 rather than Exhibit 1030.

limitations we have determined are missing from Gertz. Petitioner's challenge to claims 5-7 does not cure these deficiencies in Gertz, and the other references (DDAG and Brockschmidt) are not relied upon to meet these elements. We, therefore, determine that Petitioner has not established that the combination of Gertz, Stewart, Morrow, DDAG, and Brockschmidt renders claims 5-7 unpatentable under 35 U.S.C. § 103(a) for the reasons set forth above regarding claim 1.

F. Obviousness Ground Based on Gertz, Stewart, Morrow, DDAG, and HP86

We have determined that Gertz, Stewart, and Morrow, when combined, do not meet the "component function" and "component code" limitations of claim 1. The other references (DDAG and HP86) are not relied upon for these teachings. Petitioner's challenge to dependent claims 5-7 does not cure the deficiencies in the challenge to independent claim 1. We therefore determine that Petitioner has not established that the combination of Gertz, Stewart, Morrow, DDAG, and HP86 renders claims 5-7 unpatentable under 35 U.S.C. § 103(a) for the reasons set forth above regarding claim 1.

G. Motion to Exclude

Patent Owner's Motion filed on December 19, 2013 ("Mot.") seeks to exclude certain arguments made in Petitioner's Reply (Mot. 8) and portions of Petitioner's expert testimony (Mot. 9-14). For example, Patent Owner alleges that the contention related to Gertz teaching the claimed core driver function as a result of the cycle function in the method of a port-based object raises a new argument (Mot. 8) and that testimony of Petitioner's expert, Dr. Papanikolopoulos, advances a new position on driver functions (Mot.

12-13). Because we have not relied upon these arguments, they do not affect our decision. The issues raised in Patent Owner's Motion are moot, and the Motion is, therefore, dismissed.

Although we ultimately do not rely on these arguments for our decision, we note that a motion to exclude evidence is not the proper vehicle for resolution of a dispute regarding reply arguments and evidence exceeding the proper scope of a reply. A motion to exclude "must identify the objections in the record." 37 C.F.R. §42.64(c). In the Motion, Patent Owner does not identify where in the record an objection originally was made. If an issue arises regarding whether a reply argument or evidence in support of a reply exceeds the scope of a proper reply, the parties should contact the Board to discuss the issue.

III. CONCLUSION

We conclude that Petitioner has failed to meet its burden of proof, by a preponderance of the evidence, that claims 1-4 and 8-10 are unpatentable under 35 U.S.C. § 103 as obvious over Gertz, Stewart, and Morrow, that claims 5-7 are unpatentable under 35 U.S.C. § 103 as obvious over Gertz, Stewart, Morrow, DDAG, and Brockschmidt, and that claims 5-7 are unpatentable under 35 U.S.C. § 103 as obvious over Gertz, Stewart, Morrow, DDAG, and HP86. This is a final written decision of the Board under 35 U.S.C. § 318(a). Parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IV. ORDER

In consideration of the foregoing, it is

ORDERED that Petitioner has failed to prove by a preponderance of the evidence that claims 1-10 of U.S. Patent No. 6,516,236 B1 are unpatentable; and

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed*.

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