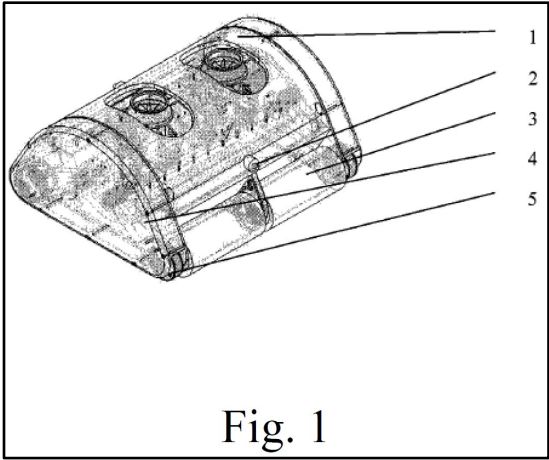
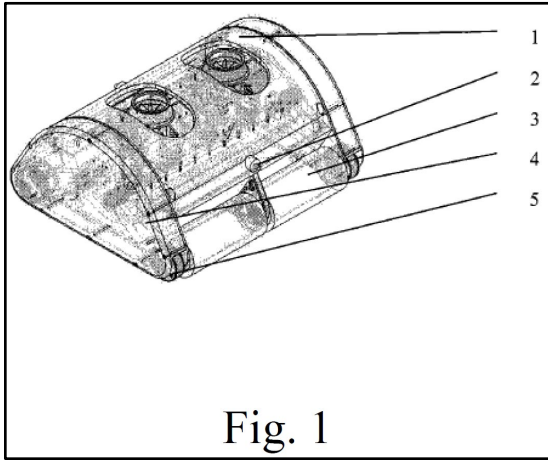
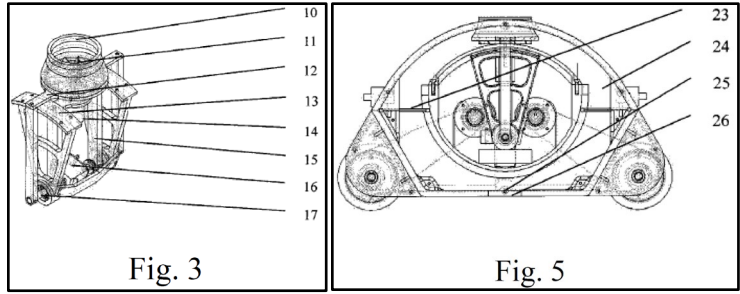


**Identification of Material Omitted from Zodiac’s Comparison
of Wybotics Petition and Reinholtz Declaration (EX2011)**

Petition for IPR of ’766 Patent	Expert Declaration of Dr. Charles F. Reinholtz
Section II.A. A. Summary Of The ’766 Patent The ’766 Patent, entitled “Pool Cleaning System and Method to Automatically Clean Surfaces of a Pool Using Images from a Camera,” issued with five total claims, each independent. EX1003, (54), claims 1-5. The claims are directed generally to a self-propelled swimming pool cleaner that uses an image captured by a camera to control the pool cleaner. <i>Id.</i>, claims 1-5 The ’766 Patent generally relates to “a robotic pool cleaner” that comprises a vehicle 30 with one or more propulsion mechanisms, a filter, a camera, and a controller. <i>Id.</i>, 3:1-19, 3:31-43. Vehicle 30 uses propulsion mechanisms, such as “wheels, rollers, tracks, or other surface contacting members powered by a motor,” to move along the submerged surfaces of the pool. <i>Id.</i>, 3:31-43. Using its filter, the pool cleaner draws water from the pool and retains any debris present in the water. <i>Id.</i>, 3:9-14. One or more cameras 32 capture an image of submerged surfaces of the pool. <i>Id.</i>, 3:46-55. Controller 42 “generate[s] control signals for steering vehicle 30 based upon signals received from cameras 32.” <i>Id.</i>, 3:51-53, 4:44-46.	Section VII.B. B. ’766 Patent 68. The ’766 Patent, entitled “Pool Cleaning System and Method to Automatically Clean Surfaces of a Pool Using Images from a Camera,” issued with five total claims, each independent. EX1003, (54), claims 1-5. The claims are directed to a self-propelled swimming pool cleaner and are substantially similar with only minor differences in wording. <i>Id.</i>, claims 1-5. <u>Each recites (1) a vehicle body, (2) means for moving the body within the pool, (3) a filter for retaining debris collected from the pool, (4) at least one camera for capturing an image of a portion of the pool, and (5) a controller for processing the image and generating corresponding control signals for moving the body. <i>Id.</i> Claim 5 additionally recites a chemical dispenser. <i>Id.</i>, claim 5.</u> 69. The ’766 Patent generally relates to “a robotic pool cleaner” that comprises a vehicle 30 with one or more propulsion mechanisms, a filter, a camera, and a controller. <i>Id.</i>, 2:67-3:3, 3:4-19, 3:31-43. The vehicle 30 uses the propulsion mechanisms, such as “wheels, rollers, tracks, or other surface contacting members powered by a motor,” to move along the submerged surfaces of the pool. <i>Id.</i>, 3:31-43. Using its filter, the pool cleaner draws water from the pool and retains any debris present in the water. <i>Id.</i>, 3:8-14. One or more cameras 32 “capture images of submerged surfaces ... of [the] pool,” and the images are used by the controller 42 “to generate control signals

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	for steering vehicle 30 based upon signals received from cameras 32.” <i>Id.</i>, 3:51-53, 4:44-46. <u>70. The '766 Patent was filed on Jan. 7, 2021 as U.S. Patent Application No. 17/143,624. <i>Id.</i>, (21), (22). The '766 Patent is the sixth in a series of continuation applications and claims priority back to U.S. Patent Application No. 13/545,918 (now U.S. Patent No. 9,388,595), filed July 10, 2012. <i>Id.</i>, (63).</u> <u>71. I have reviewed the file history of the '766 Patent, and I understand that originally filed claims 1-19 were copies of the claims filed in a parent application in the series, U.S. Patent Application No. 16/416,840 (the “’840 application”). Compare EX1004 (file history of the '766 Patent), 17-19 with EX1009 (file history of the '840 application), 17-19. Prior to examination, the applicant filed a preliminary amendment, canceling claims 1-19 and adding new claims 20-24, which have since issued as claims 1-5 of the '766 Patent. EX1004, 38-42. I also understand that the Examiner identified “a controller (i) positioned on or in the body, (ii) in electronic communication with the at least one camera, and (iii) configured to generate, in response to the captured image, at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface” of claim 20 as allegedly being inventive over the prior art. <i>Id.</i>, 133-137 (also identifying the “controller” limitations of claims 21-24 as allegedly inventive over prior art). However, as I explain below, the purportedly inventive feature asserted by the Examiner was very well known in the art. See <i>infra</i> Sections XII.A.1.f-h, XII.B-C.</u>
Section IV.A.1.	Section X.A.

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1. Summary Of Fu Fu, entitled “Underwater Cleaning Robot,” was filed on July 31, 2007 as Application No. 200710119800.5 in China. EX1007, (19), (21), (22). Fu issued as Grant Publication No. CN 101139007 B, and published on June 15, 2011. <i>Id.</i>, (10), (45). Fu is therefore prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (b). Fu describes a robot designed “for the underwater cleaning of swimming pool floors and walls.” <i>Id.</i>, Abstract.  Fig. 1 <i>Id.</i>, Fig. 1. The underwater cleaning robot has two operational modes: (i) manual mode, where a control keypad is used to send control signals to the robot; and (ii) autonomous mode, where the control system controls the robot’s operations based on an image received from cameras. <i>Id.</i>, ¶[0025]. The robot “comprises a drainage mechanism, a cleaning and	A. Fu 90. Fu, entitled “Underwater Cleaning Robot,” was filed on July 31, 2007 as Application No. 200710119800.5 in China. EX1007, (19), (21), (22). Fu issued as Grant Publication No. CN 101139007 B, and published on June 15, 2011. <i>Id.</i>, (10), (45). Fu is therefore prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (b). 91. Fu describes a robot that is designed “for the underwater cleaning of swimming pool floors and walls.” <i>Id.</i>, Abstract. An example of Fu’s underwater cleaning robot is depicted in Figure 1:  Fig. 1 <i>Id.</i>, Fig. 1. 92. Fu describes two operational modes for cleaning: manual and autonomous. <i>Id.</i>, ¶[0025]. In the manual mode, a control keypad is used to manually send control signals to the

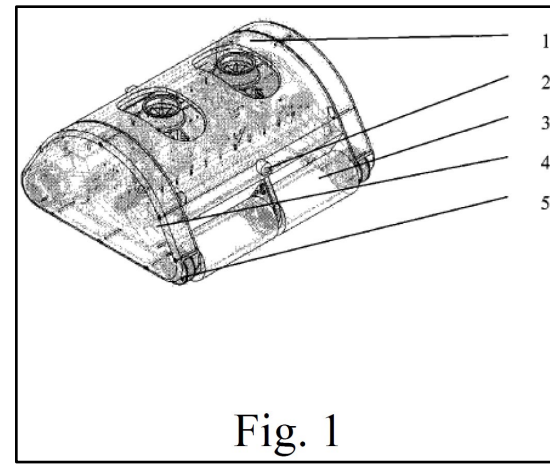
Petition for IPR of '766 Patent	Expert Declaration of Dr. Charles F. Reinholtz
mobility platform, and a control system.” <i>Id.</i>, ¶[0024]. These three units coordinate to “perform cleaning tasks autonomously or via remote control underwater on horizontal, vertical, and inclined surfaces.” <i>Id.</i>, Abstract. The drainage mechanism filters pool water by drawing in water, filtering it to remove any debris, and discharging the filtered water into the pool. <i>Id.</i>, ¶[0024]-[0026]. The cleaning and mobility platform provides structural support and propulsion to the robot, while also performing “brush-cleaning” of the pool surface via cleaning driving wheels 3. <i>Id.</i> The control system autonomously controls the robot’s operations by generating control signals based on an image received from monitoring cameras 2, that are installed on the robot’s housing. <i>Id.</i>	robot. <i>Id.</i> In the autonomous mode, the control system autonomously plans and controls the robot’s movement and cleaning operations based on data received from sensors and cameras. <i>Id.</i> 93. The robot “comprises a drainage mechanism, a cleaning and mobility platform, and a control system.” <i>Id.</i>, ¶[0024]. These three units work in coordination to “perform cleaning tasks autonomously or via remote control underwater on horizontal, vertical, and inclined surfaces.” <i>Id.</i>, Abstract. 94. The drainage mechanism performs a cleaning function by drawing pool water into the robot, filtering it to remove any debris, and discharging the filtered water back into the pool. <i>Id.</i>, ¶[0024]-[0026]. An example schematic of the drainage mechanism is illustrated in Figures 3 and 5:  <u><i>Id.</i>, Fig. 3 (water discharger), Fig. 5 (side cross-sectional view of the robot).</u> 95. The drainage mechanism “comprises a water discharger [Figure 3], a water flow channel 24 ..., a water flow filter screen 23, and a water inlet [26] with an anti-backflow device 25.” <i>Id.</i>

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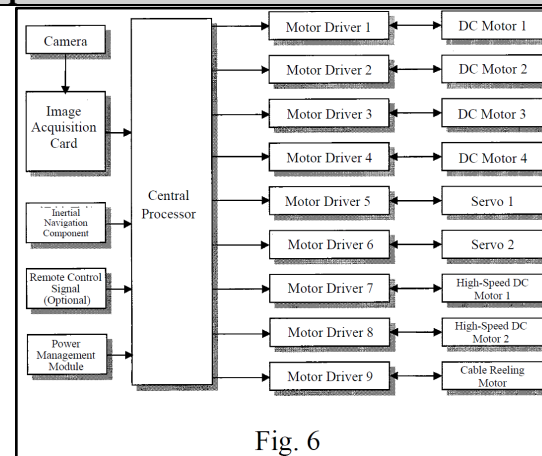
¶[0024]. During operation, “the drainage propeller high-speed DC motor 14 ... drives the drainage propeller 11 to rotate ... expel[ling] water from within the robot’s water flow channel 24, creating a high negative pressure inside.” *Id.*, ¶[0026]. This negative pressure “draws pool water from the bottom of the robot into the water flow channel 24 through the water inlet [26].” *Id.* Once in the flow channel 24, the “water passes through the water flow filter screen 23, which filters out debris, and the clean water is then discharged.” *Id.*

96. The drainage mechanism “uses the cleaning and mobility platform as a carrier and coordinates its movement with the cleaning and mobility platform.” *Id.*, ¶[0024]. The cleaning and mobility platform, illustrated in Figure 1, comprises “a robot housing body 1, cleaning driving wheels 3, synchronous belt gears 5, and a driving synchronous belt 4.” *Id.*



Id., Fig. 1.

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	97. <u>The “cleaning driving wheels 3 are controlled by their respective motor drivers ... By using different combinations of wheel speeds, the robot can perform tasks such as moving forward, backward, turning, and brush-cleaning.” <i>Id.</i>, ¶[0026]. The synchronous belt gears 5 and the driving synchronous belt 4 help drive the cleaning driving wheels 3 via a driving DC motor 7. <i>Id.</i>, ¶[0024].</u> ~~---~~ In this way, the cleaning and mobility platform provides structural support and propulsion to the robot, while also performing “brush-cleaning” of the pool surface via the cleaning driving wheels 3. <i>Id.</i>, ¶[0024], [0026]. 98. The control system autonomously controls the robot’s operation by generating control signals that drive the robot’s movement and cleaning. <i>Id.</i> ~~---~~ <u>As shown in Figure 6, the control system comprises “a central processor, monitoring cameras, an image acquisition card, inertial navigation components, a remote control signal interface, motor drivers, a control system box 8, cleaning driving wheel DC motors 7, a water outlet driving servo 16, a drainage propeller high-speed DC motor 14, a driving and control sealed housing, and a control and power management system.” <i>Id.</i>, ¶[0024].</u>



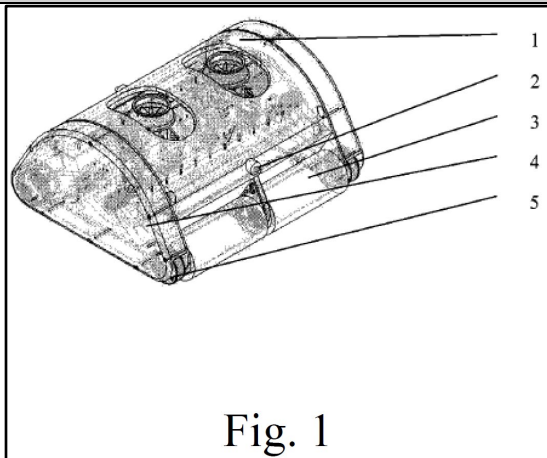
Id., Fig. 6.

99. Fu's monitoring cameras 2, installed on the main robot housing body 19, are in communication with the central processor via the image acquisition card. *Id.*, ¶[0024], Fig. 6. "The monitoring cameras 2 and the image acquisition card constitute the environmental perception layer," which also "constitutes the input part of the control system." *Id.*, ¶[0024]. The central processor receives an image from the environmental perception layer, *i.e.*, monitoring cameras 2, and processes it to determine "the level of cleanliness" of the pool. *Id.*, ¶[0026]. Based on this determination, "control signals are generated by the central processor, which autonomously plans paths and actions ... to ... complete the underwater cleaning task." *Id.*, ¶[0025]. The central processor sends these control signals to "the robot's execution layer," also known as the "output part of the control system," which comprises "the motor drivers and the cleaning driving wheel DC motors 7." *Id.*, ¶[0024]-[0025]. Based on the control signals, the respective motor drivers and

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	<u>the cleaning driving wheel DC motors 7 drive the cleaning driving wheels 3. <i>Id.</i>, ¶[0026]. For example, “the speed of each wheel 3 can be adjusted,” “cleaning actions of varying intensity can be achieved,” and “the robot can perform tasks such as moving forward, backward, turning, and brush-cleaning.” <i>Id.</i></u> <u>100. In this way, Fu’s drainage mechanism, cleaning and mobility platform, and control system work in concert to control the underwater cleaning robot’s movement and cleaning operations based on an image captured by the monitoring cameras 2.</u>
Section IV.A.2. Claim 1 (a) Preamble: “A self-propelled pool cleaning system for cleaning debris from a submerged surface of a swimming pool, comprising:” To the extent limiting, claim 1’s preamble is disclosed by Fu. EX1010, ¶¶225-228. Fu discloses “an underwater cleaning robot” designed “for the underwater cleaning of swimming pool floors and walls.” EX1007, Abstract.	Section XIII.A.1 Claim 1 a. Preamble: “A self-propelled pool cleaning system for cleaning debris from a submerged surface of a swimming pool, comprising:” [Patent Owner mistakenly cited a portion of Dr. Reinholtz’s Declaration from the '207 Patent in its comparison, not for the '766 Patent; thus, a line-by-line comparison of this element for omitted material would not be meaningful.]

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Id., Fig. 1 (underwater cleaning robot). Fu's robot comprises "a drainage mechanism [and] a cleaning and mobility platform." *Id.*, ¶[0024]. The cleaning and mobility platform enables the robot to move around the pool and remove debris from its surfaces, *e.g.*, using brushes. *Id.*, ¶¶[0010], [0024]-[0026] ("brush-cleaning"). The drainage mechanism "draws pool water from the bottom of the robot" such that the "water passes through the water flow filter screen 23, which filters out debris, and the clean water is then discharged." *Id.*, ¶[0026]. Thus, Fu's underwater cleaning robot is a "pool cleaner for cleaning debris from a submerged surface of a swimming pool."

Fu's robot is also self-propelled. The robot's cleaning and mobility platform comprises "four independent cleaning driving wheels 3" that "are controlled by their respective motor drivers, allowing for independent movement." *Id.*, ¶[0026]. In the autonomous mode, "control signals are generated by the central processor, which autonomously plans paths and actions ... to drive the robot's execution layer and complete the underwater

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cleaning task.” <i>Id.</i>, ¶[0025]. The execution layer comprises motor drivers and cleaning driving wheel DC motors 7, which drive cleaning driving wheels 3. <i>Id.</i>, ¶[0024]. Fu’s robot is thus “self-propelled” because it moves without external propulsion. Fu also describes various components for powering such movement, including an onboard “rechargeable battery box.” <i>Id.</i>, ¶¶[0007], [0008], [0024], [0025]. Thus, Fu discloses a “self-propelled pool cleaner [underwater cleaning robot] for cleaning debris from a submerged surface of a swimming pool.”	
Section IV.A.3. 3. Claim 2 Claim 2 is anticipated by Fu for the reasons explained for claim 1. <i>Id.</i>, ¶¶254-255. Claim 2 recites all the limitations of claim 1, with the only difference being that claim 2 recites “at least one camera carried by the body,” whereas claim 1 recites “at least one camera mounted directly or indirectly to the body”: <u>12</u>. A self-propelled pool cleaner for cleaning debris from a submerged surface of a swimming pool, comprising: a. a vehicle body; b. means for moving the vehicle body within the swimming pool; c. a filter configured to retain debris collected from the submerged surface;	Section XII.A.2. 2. Independent Claim 2 254. Claim 2 is anticipated by Fu for the reasons explained above for claim 1. Claim 2 recites all the limitations of claim 1, with the only difference being that claim 2 recites “at least one camera carried by the body,” whereas claim 1 recites “at least one camera mounted directly or indirectly to the body”: <u>12</u>. A self-propelled pool cleaner for cleaning debris from a submerged surface of a swimming pool, comprising: a. a vehicle body; b. means for moving the vehicle body within the swimming pool; c. a filter configured to retain debris collected from the submerged surface;

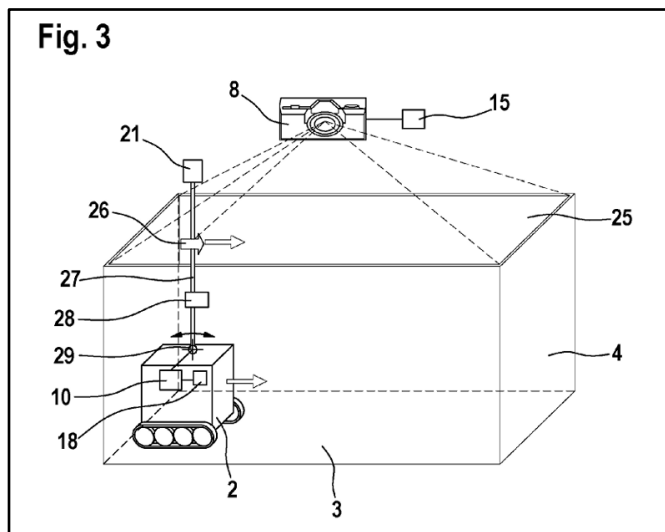
Petition for IPR of '766 Patent	Expert Declaration of Dr. Charles F. Reinholtz
d. at least one camera ~~mounted directly or indirectly to~~<u>carried by</u> the body for capturing an image of at least a first portion of the submerged surface; and e. a controller (i) positioned on or in the body, (ii) in electronic communication with the at least one camera, and (iii) configured to generate, in response to the captured image, at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface. These limitations are substantially the same, differing only in wording. A camera that is “mounted directly or indirectly to the body” is, by definition, “carried by the body.” Thus, Fu anticipates claim 2. <i>Id.</i>, ¶¶254-255. [Redlines in this section are in the original.]	d. at least one camera ~~mounted directly or indirectly to~~<u>carried by</u> the body for capturing an image of at least a first portion of the submerged surface; and e. a controller (i) positioned on or in the body, (ii) in electronic communication with the at least one camera, and (iii) configured to generate, in response to the captured image, at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface. 255. These limitations are substantially the same, differing only in wording. A camera that is mounted directly or indirectly to the body is, by definition, carried by the body. Thus, Fu anticipates claim 2. [Redlines in this section are in the original.]
Section IV.A.5. 5. Independent Claim 4 Claim 4 is anticipated by Fu for the reasons explained for claim 1. <i>Id.</i>, ¶¶271-273. Claim 4 recites all the limitations of claim 1, but claim 4 is broader because it does not require the “at least one camera” to be “mounted directly or indirectly to the body” as claim 1 does: <u>4.</u> A self-propelled pool cleaner for cleaning debris from a submerged surface of a swimming	Section XII.A.4. 4. Independent Claim 4 271. Claim 4 is anticipated by Fu for the reasons explained above for claim 1. Claim 4 recites all the limitations of claim 1, but claim 4 is broader because it does not require the “at least one camera” to be “mounted directly or indirectly to the body” as claim 1 does:

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pool, comprising: a. a vehicle body; b. means for moving the vehicle body within the swimming pool; c. a filter configured to retain debris collected from the submerged surface; d. at least one camera ~~mounted directly or indirectly to the body~~ for capturing an image of at least a first portion of the submerged surface; and e. a controller (i) positioned on or in the body, (ii) in electronic communication with the at least one camera, and (iii) configured to generate, in response to the captured image, at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface. Because Fu anticipates the narrower claim 1, Fu likewise anticipates the broader claim 4. Thus, Fu anticipates claim 4. <i>Id.</i>, ¶¶271-273. [Redlines in this section are in the original.]	~~14~~. A self-propelled pool cleaner for cleaning debris from a submerged surface of a swimming pool, comprising: a. a vehicle body; b. means for moving the vehicle body within the swimming pool; c. a filter configured to retain debris collected from the submerged surface; d. at least one camera ~~mounted directly or indirectly to the body~~ for capturing an image of at least a first portion of the submerged surface; and e. a controller (i) positioned on or in the body, (ii) in electronic communication with the at least one camera, and (iii) configured to generate, in response to the captured image, at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface. 272. Because Fu anticipates the narrower claim 1, Fu likewise anticipates the broader claim 4 eliminating the requirement that the camera be mounted to the body. 273. Fu anticipates claim 4. [Redlines in this section are in the original.]
Section IV.C.1.	Section X.C.

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1. Summary Of Benzler Benzler, EX1013, entitled “Activation System for a Robotic Vehicle,” was filed on May 16, 2008 as PCT/EP08/56016, and published on Nov. 25, 2010 as U.S. Patent Pub. No. 2010/0299016. EX1013, (10), (22), (43), (86). Benzler is therefore prior art under at least pre-AIA 35 U.S.C. §§ 102(a), (b), and (e). Benzler describes “an activation system (1) for a robotic vehicle (2)” that uses image-based navigation to autonomously control movement of vehicle (2) within a work area 3. <i>Id.</i>, Abstract, ¶[0037]. The system includes at least one “camera (8) configured for generating image data of a work area (3)” and a “logic unit (10) configured for determining the position of the at least one robotic vehicle (2) based on the image data generated by the camera (8).” <i>Id.</i>, Abstract. “The logic unit 10 calculates driving instructions for the robotic vehicle 2 based on the image data,” and the driving instructions are transmitted to robotic vehicle 2 for execution. <i>Id.</i>, ¶[0044]-[0046]. Benzler describes several example embodiments of the activation system, such as “a snow cleaning vehicle, [a] leaf collecting vehicle, [a] grass collecting vehicle, thatching vehicle, or [a] weeding vehicle ...[and] as a lawnmower.” <i>Id.</i>, ¶[0023]. In a “particularly preferred” embodiment, “the robotic vehicle is construed as [a] pool-robotic vehicle, thus in particular as [a] filter vehicle and/or cleaning or purifying vehicle ... [that] drive[s] in particular on the bottom of a pool, which then creates the work area.” <i>Id.</i>, ¶[0028]. In this pool embodiment, “[t]he external border 4 of the work area 3 is created by the surrounding pool	C. Benzler 114. Benzler, EX1013, entitled “Activation System for a Robotic Vehicle,” was filed on May 16, 2008 as PCT/EP08/56016, and published on Nov. 25, 2010 as US Patent Pub. No. 20100299016. EX1013, (10), (22), (43), (86). Benzler is therefore prior art under at least pre-AIA 35 U.S.C. §§ 102(a), (b), and (e). 115. Benzler describes “an activation system (1) for a robotic vehicle (2)” that uses image-based navigation to autonomously control movement of the vehicle (2) within a work area 3. <i>Id.</i>, ¶[0037]. The system includes at least one “camera (8) configured for generating image data of a work area (3)” and a “logic unit (10) configured for determining the position of the at least one robotic vehicle (2) based on the image data generated by the camera (8).” <i>Id.</i>, Abstract. 116. “The logic unit 10 calculates driving instructions for the robotic vehicle 2 based on the image data,” and the driving instructions are transmitted to the robotic vehicle 2 for execution. <i>Id.</i>, ¶[0044]-[0046]. ~~---~~ <u>Benzler further describes that the “logic unit automatically calculates a trajectory for the robotic vehicle based on the image data” “in such a way that the entire work area or a ... pre-defined section of the work area is at least almost completely driven along.” <i>Id.</i>, ¶[0024]. In a “particularly advantageous” embodiment, “the logic unit detects differently conditioned sections of the work area ... based on the image data and then considers this information when calculating the driving instructions, in particular in such a way</u>

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walls.” Figure 3 illustrates the activation system as pool robotic vehicle 2 (*id.*, ¶¶[0036], [0051]-[0056]):



Id., Fig. 3.

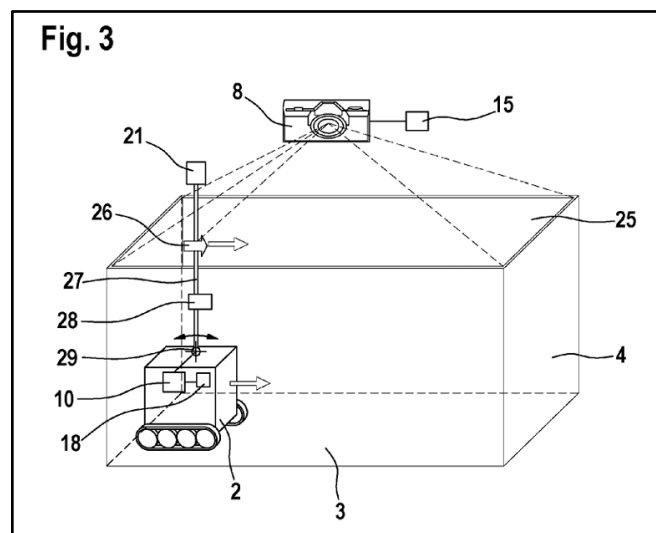
Camera 8 transmits data via logic unit 10 to control unit 18, “which controls the not shown drive means” for driving robotic cleaning vehicle 2. *Id.*, ¶[0054].

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that the robotic vehicle does only or preferably move[s] on one of those [differently conditioned] sections[.]” *Id.*, ¶[0016].

117. Benzler describes several example embodiments of the activation system, such as “a snow cleaning vehicle, [a] leaf collecting vehicle, [a] grass collecting vehicle, thatching vehicle, or [a] weeding vehicle ...[and] as a lawnmower.” *Id.*, ¶[0023].

118. In a “particularly preferred” embodiment, “the robotic vehicle is [constructed] as [a] pool-robotic vehicle, thus in particular as [a] filter vehicle and/or cleaning or purifying vehicle ... [that] drive[s] in particular on the bottom of a pool, which then creates the work area.” *Id.*, ¶[0028]. In this underwater embodiment, “[t]he external border 4 of the work area 3 is created by the surrounding pool walls.” Figure 3 illustrates a schematic of the activation system construed as a pool robotic vehicle 2 (*id.*, ¶¶[0036], [0051]-[0056]):



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	<i>Id.</i>, Fig. 3. 119. Benzler discloses a camera 8 for guiding the pool cleaning implementation of robotic vehicle 2. <i>Id.</i>, ¶[0053]. The camera 8 transmits data via the logic unit 10 to the control unit 18, “which controls the not shown drive means” for driving the pool cleaning vehicle 2. <i>Id.</i>, ¶[0054]. In the pool-cleaning context, the camera 8 may capture a “differently conditioned” portion of the submerged pool surface, such as a cleaned or not cleaned portion of the surface, and control the position of the vehicle 2 accordingly. <i>Id.</i>, ¶[0016].
Section IV.C.2. 2. Obviousness Of The “To, Or Away From” Limitation Over Fu In View Of Benzler To the extent the Board determines that Fu alone does not anticipate or render obvious the “at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface,” claims 1-4 are nonetheless obvious over Fu in combination with Benzler. EX1010, ¶¶278-283. The similar disclosures of Fu and Benzler would have motivated a POSA to consider them together. <i>Id.</i>, ¶¶279-282. Fu discloses capturing an image of the pool floor, comparing it to a cleanliness threshold to determine a level of cleanliness, and then adjusting the robot’s operations accordingly. EX1007, ¶[0026]. Likewise, Benzler describes an autonomous robotic cleaning system, with a pool cleaning embodiment, that makes movement and cleaning decisions based on an image of the work area. Section IV.C.1;	Section XII.C.1. 1. Obviousness Of The “To, Or Away From” Limitation Over Fu In View Of Benzler 278. To the extent that Fu alone does not anticipate or render obvious the claimed “at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface,” claims 1-4 are nonetheless obvious over Fu in combination with Benzler. 279. A POSA would have been motivated to combine Fu and Benzler to yield the claimed control signal for causing movement “to, or away from” a portion of the submerged surface captured by the camera. As detailed in Section XII.A.1.h above, Fu discloses capturing an image, comparing them to a cleanliness threshold to determine a level of cleanliness, and then planning movement and adjusting the working state of a robot’s drive wheels to complete a cleaning task. EX1007, ¶[0026]. Benzler, like Fu, describes an

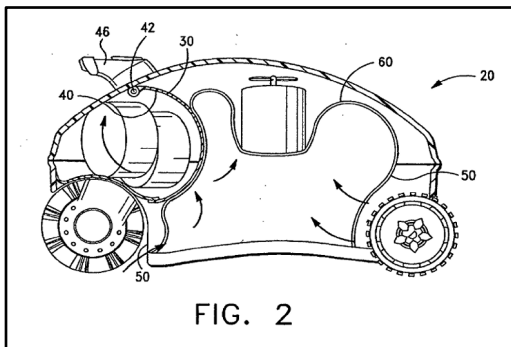
Petition for IPR of '766 Patent	Expert Declaration of Dr. Charles F. Reinholtz
EX1013, Abstract, ¶¶[0016], [0018], [0028], [0037], [0044]-[0046], [0053]. Benzler describes various embodiments of its robotic vehicle, such as an autonomous lawnmower. EX1013, ¶[0023]. In this embodiment, “the logic unit ... is ... construed in such a way that differently conditioned sections (mowed/not mowed) ... are detected and the driving instructions are calculated in such a way that preferably the mowed section ... is driven along.” <i>Id.</i>, ¶¶[0018], [0023], [0045]. In embodiments, “the logic unit detects differently conditioned sections of the work area, for example a mowed or a not mowed section of the work area based on the image and then considers this information when calculating the driving instructions, in particular in such a way that the robotic vehicle does only or preferably move on one of those sections, in particular the not mowed lawn section.” <i>Id.</i>, ¶[0016]. Thus, Benzler uses an image to cause motion “only or preferably” toward target sections and away from non-target sections. <i>Id.</i>, ¶¶[0016], [0018], [0045]. A POSA would have been motivated to incorporate Benzler’s image-based classification-driven motion control into Fu because it is a known technique for improving coverage efficiency and cleaning performance, satisfies design needs to prioritize dirty areas and reduce redundant cleaning, and represents one of a finite, predictable set of control options once regions are classified with respect to a threshold. EX1010, ¶282. Applying Benzler’s classification-driven motion to Fu’s thresholded cleanliness determinations would have yielded the control signal for causing movement “to, or away from” a portion of the submerged surface captured by the camera, with the robot moving toward sub-threshold (dirtier) regions and away from above-threshold	autonomous robotic cleaning system that makes movement and cleaning decisions based on an image of the cleaning surface or work area, including “differently conditioned” sections of the work area. EX1013, Abstract, ¶¶[0016], [0018], [0028], [0037], [0044]-[0046], [0053]. <u>In particular, Benzler describes an activation system for a robotic vehicle 2 that includes (i) a digital camera 8 for capturing an image of the work area, and (ii) a logic unit 10 that evaluates the image to generate driving instructions for the robotic vehicle 2. <i>Id.</i>, Abstract.</u> <u>280. In a “particularly preferred” embodiment, Benzler’s robotic vehicle is a “pool-robotic vehicle ... in particular as a filter vehicle and/or cleaning or purifying vehicle,” which drives on the bottom of a pool to perform its cleaning function. <i>Id.</i>, ¶[0028]. Benzler further explains that “the internal or external logic unit automatically calculates a trajectory for the robotic vehicle based on the image data that is in particular continuously determined by the external camera.” <i>Id.</i>, ¶[0024]. These disclosures confirm that Benzler, like Fu, is directed to an autonomous robotic cleaner that uses image-derived information to guide its movement and cleaning, and in particular, includes an embodiment where the cleaning is performed in a pool environment using camera-based navigation. The similar disclosures of Fu and Benzler would have motivated a POSA to consider these references together.</u> 281. Benzler further describes embodiments in which the robotic vehicle is implemented as an autonomous lawnmower, a snow cleaning vehicle, a gas collecting vehicle, a thatching vehicle, a weeding vehicle, etc. <i>Id.</i>, ¶[0023]. In the autonomous lawnmower embodiment, for instance, “the logic unit ... is ... construed in such a way that differently conditioned sections

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(cleaner) regions. <i>Id.</i> A POSA would also have had a reasonable expectation of success. The combination does not require new hardware or unconventional algorithms; Fu already discloses the cameras, processor, and wheels, and it “plans” movement and “adjusts” wheel states based on cleanliness determinations. Implementing Benzler’s classification-based movement entails routine controller configuration that would have been within a POSA’s skill. <i>Id.</i>, ¶282. Thus, Fu in view of Benzler renders obvious the “to, or away from” control-signal limitation of claims 1-4 by teaching and motivating use of an image to control motion toward target (dirtier) regions and away from non-target (cleaner) regions. <i>Id.</i>, ¶¶278-283. Claims 1-4 would have been obvious over Fu in view of Benzler. <i>Id.</i>, ¶¶278-283.	(mowed/not mowed) ... are detected and the driving instructions are calculated in such a way that preferably the mowed section ... is driven along.” <i>Id.</i>, ¶¶[0018], [0045]. Benzler also discloses that in embodiments, “the logic unit detects differently conditioned sections of the work area, for example a mowed or a not mowed section of the work area based on the image data and then considers this information when calculating the driving instructions, in particular in such a way that the robotic vehicle does only or preferably move on one of those sections, in particular the not mowed lawn section.” <i>Id.</i>, ¶[0016]. Thus, Benzler uses image-based classification of differently conditioned sections to cause motion “only or preferably” toward target sections and away from non-target sections. <i>Id.</i>, ¶¶[0016], [0018], [0045]. 282. A POSA would have been motivated to incorporate Benzler’s classification-driven motion control into Fu because it is a known technique for improving coverage efficiency and cleaning performance, satisfies design needs to prioritize dirty areas and reduce redundant cleaning, and represents one of a finite, predictable set of control options once regions are classified with respect to a threshold. Applying Benzler’s classification-driven motion to Fu’s thresholded cleanliness determinations would have yielded the claimed control signal for causing movement “to, or away from” a portion of the submerged surface captured by the camera, with the robot moving toward sub-threshold (dirtier) regions and away from above-threshold (cleaner) regions. A POSA would also have had a reasonable expectation of success. The combination does not require new hardware or unconventional algorithms; Fu already discloses the cameras, processor, and wheels, and it “plans” movement and “adjusts” wheel states based on

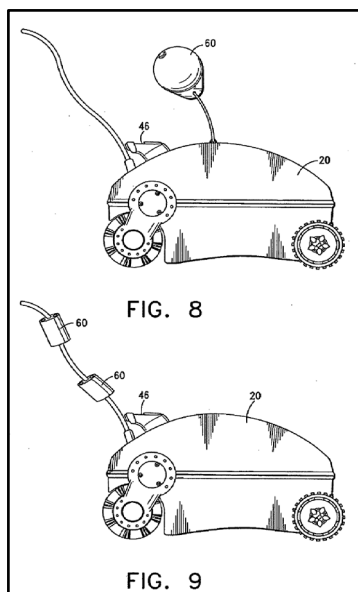
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	cleanliness determinations. Implementing Benzler's classification-based movement entails routine controller configuration that would have been within a POSA's skill. 283. In sum, even if Fu alone were deemed insufficient, the combination of Fu with Benzler renders obvious the "to, or away from" control-signal limitation of claims 1-4 by teaching and motivating the use of image-based region classification to control motion toward target (dirtier) regions and away from non-target (cleaner) regions, with a reasonable expectation of success.
Section IV.D.1. 1. Summary of Hui Hui, EX1019, entitled "Pool Cleaning Vehicle Having Structure for Cleaning and Sanitizing Pool Water," was filed on Nov. 18, 2008 as U.S. Patent Application No. 12/272,908, and published on June 16, 2011 as U.S. Patent Pub. No. 2011/0139727. EX1019, (10), (21), (22), (43), (54). Hui is therefore prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (b). Hui discloses an automated pool cleaning vehicle "which includes the ability for cleaning and sanitizing pool water." EX1019, Abstract, ¶[0001]. The cleaning is performed via "a filter bag, which traps dirt and debris and prevents its return to the pool water," while the sanitizing is performed via "a chemical dispenser [30] for adding chemicals to pool water." <i>Id.</i>, ¶[0012]. The chemical dispenser has "a hollow interior suitable for storing chemicals for sanitizing pool water," and is configured to release the chemicals, such as chlorine, as water passes through it. <i>Id.</i>, Abstract, ¶¶[0006], [0018], [0022], [0041]. The chemical	Section X.D. D. Hui 120. Hui, EX1019, entitled "Pool Cleaning Vehicle Having Structure for Cleaning and Sanitizing Pool Water," was filed on Nov. 18, 2008 as U.S. Patent Application No. 12/272,908., and published on June 16, 2011 as U.S. Patent Pub. No. 20110139727. EX1019, (10), (21), (22), (43), (54). Hui is therefore prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (e). 121. Hui discloses an automated pool cleaning vehicle "which includes the ability for cleaning and sanitizing pool water." EX1019, Abstract, ¶[0001]. In Hui, the cleaning function is achieved through "a filter bag, which traps dirt and debris and prevents its return to the pool water," while the sanitizing function is achieved through "a chemical dispenser [30] for adding chemicals to pool water." <i>Id.</i>, ¶[0012]. The chemical dispenser has "a hollow interior suitable for storing chemicals for sanitizing pool water," and is configured to release the

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dispenser may be within the housing (Figure 2), or connected externally to the housing (Figures 8 and 9):

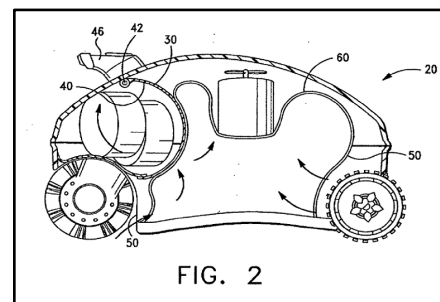


Id., Fig. 2.

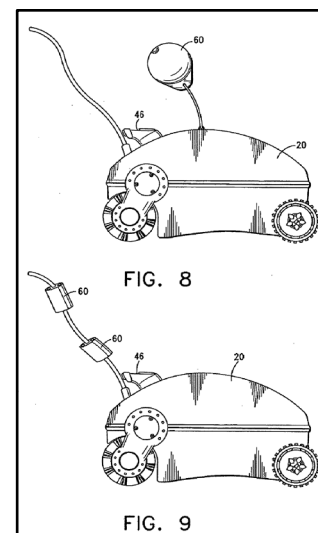


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chemicals, such as chlorine, as water passes through it. *Id.*, Abstract, ¶¶[0006], [0022], [0041]. Hui further teaches that the chemical dispenser may be within the housing, as shown in Figure 2, or connected externally to the housing, as shown in Figures 8 and 9:



Id., Fig. 2.



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<i>Id.</i>, Figs. 8-9 (annotated), ¶[0053] (showing “chemical packet inside the container [60]”). In Figure 2, chemical dispenser member 30 is place within a compartment 40 of swimming pool vehicle 20. <i>Id.</i>, ¶¶[0042]-[0043]. Chemical dispenser 30 contains chemical packets 32 whose seal dissolves upon contact with water, allowing the chemical content to mix with the passing water. <i>Id.</i>, ¶¶[0022], [0039]-[0040], [0047]. Chemical dispenser 30 is downstream of filter bag 60 such that water entering through inlets 50 first passes through filter bag 60, where dirt and debris are trapped, and then continues to chemical dispenser 30, where the filtered water mixes with the chemicals. <i>Id.</i>, ¶¶[0046], [0050]-[0051]. Thus, the water exiting through the outlet of compartment 40 is both free of debris, as well as sanitized. <i>Id.</i>, ¶[0052]. In this way, Hui’s pool cleaning vehicle performs both mechanical filtration and chemical sanitization, with chemical dispenser 30 being placed “on, in, or carried by” the vehicle body.	<i>Id.</i>, Figs. 8-9, ¶[0053] (showing “chemical packet inside the container [60]”). 122. In the embodiment shown in Figure 2, the chemical dispenser member 30 is placed within a compartment 40 of the swimming pool vehicle 20. <i>Id.</i>, ¶¶[0042]-[0043]. The chemical dispenser 30 contains chemical packets 32 whose seal dissolves upon contact with water, allowing the chemical content to mix with the passing water. <i>Id.</i>, ¶¶[0022], [0039]-[0040], [0047]. The chemical dispenser 30 is downstream of the filter bag 60 such that water entering through inlets 50 first passes through the filter bag 60, where dirt and debris are trapped, and then continues to the chemical dispenser 30, where the filtered water mixes with the chemicals. <i>Id.</i>, ¶¶[0046], [0050]-[0051]. Thus, the water exiting through the outlet of compartment 40 is both free of debris, as well as sanitized. <i>Id.</i>, ¶[0052]. In this way, Hui’s pool cleaning vehicle performs both mechanical filtration and chemical sanitization, with the chemical dispenser 30 being placed “on, in, or carried by” the vehicle body.
Section IV.D.2. 2. Independent Claim 5 Claim 5 would have been obvious over Fu in view of Hui. EX1010, ¶¶284-292. The preamble and elements 5a-5c of claim 5 are the same as the preamble and elements 1a-1c of claim 1: 45. A self-propelled pool cleaner for cleaning debris from a submerged surface of a swimming pool, comprising: a. a vehicle body;	Section XII.D.1. 1. Independent Claim 5 284. Claim 5 would have been obvious over Fu in view of Hui. The preamble and elements 5a-5c of claim 5 are the same as the preamble and elements 1a-1c of claim 1: 45. A self-propelled pool cleaner for cleaning debris from a submerged surface of a swimming pool, comprising: a. a vehicle body;

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b. means for moving the vehicle body within the swimming pool; c. a filter configured to retain debris collected from the submerged surface; <u>d. a chemical dispenser on, in, or carried by the vehicle body;</u> ~~de.~~ at least one camera ~~mounted directly or indirectly to the~~<u>on, in, or carried by the vehicle</u> body, for capturing an image of at least a first portion of the submerged surface; and ~~ef.~~ a controller (i) ~~positioned on or~~<u>in, or carried by</u> the <u>vehicle</u> body, (ii) in electronic communication with the at least one camera and (iii) configured to generate, in response to the captured image, at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface. Similarly, elements 5e and 5f are substantially the same as elements 1d and 1e-1g respectively, differing only in wording. <i>See</i> Section IV.A.2.e-h. Therefore, the preamble and elements 5a-5c and 5e-5f are disclosed by Fu for the reasons explained in Ground 1a for claim 1. [Redlines in this section are in the original.]	b. means for moving the vehicle body within the swimming pool; c. a filter configured to retain debris collected from the submerged surface; <u>d. a chemical dispenser on, in, or carried by the vehicle body;</u> ~~de.~~ at least one camera ~~mounted directly or indirectly to the~~<u>on, in, or carried by the vehicle</u> body, for capturing an image of at least a first portion of the submerged surface; and ~~ef.~~ a controller (i) ~~positioned on or~~<u>in, or carried by</u> the <u>vehicle</u> body, (ii) in electronic communication with the at least one camera and (iii) configured to generate, in response to the captured image, at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface. 285. Similarly, elements 5e and 5f are substantially the same as elements 1d and 1e-1g respectively, differing only in wording. <i>See</i> Sections XII.A.1.e-h. Therefore, the preamble and elements 5a-5c and 5e-5f are disclosed by Fu for the reasons explained in Ground 1a for claim 1. [Redlines in this section are in the original.]

(a) Element 5d: “a chemical dispenser on, in, or carried by the vehicle body;”

Element 5d would have been obvious over Fu in view of Hui. EX1010, ¶¶287-291. Hui’s pool cleaning vehicle discloses chemical dispenser 30 that may be “on, in, or carried by” the vehicle body. Section IV.D.1; EX1019, ¶[0012], Figs. 2, 8-9. A POSA would have been motivated to combine Hui’s chemical dispenser with Fu’s autonomous pool cleaning robot to provide an improved pool cleaning system capable of both mechanical filtration and chemical sanitization. EX1010, ¶¶288-290. Both Fu and Hui are directed to the same field: automated pool cleaning robots that filter pool water; and both share a common functional architecture: a self-propelled underwater vehicle with inlets, outlets, and an internal water flow path where filtration occurs. EX1007, ¶¶[0024], [0026]; EX1019, ¶¶[0046], [0050]-[0051]. Fu’s robot comprises a drainage mechanism that draws pool water through water inlet 26 into the robot’s water flow channel 24, passes the water through water flow filter screen 23 to remove debris, and then discharges the filtered water back into the pool. EX1007, ¶¶[0024], [0026].

A POSA would recognize that Hui’s chemical dispenser enhances Fu’s robot by adding a sanitization step with a simple modification. EX1010, ¶¶288-290. It is commonly known by even laymen that removal of debris alone is insufficient to maintain safe swimming conditions. *Id.* In fact, most swimming pools utilize some method of water sanitization to eliminate harmful microorganisms, addition of chlorine being the most common method. *Id.* Hui recognizes this need, explaining that “it is simply not enough for the water to be clean or in other words, relatively free of dirt and debris, it must be sanitary.” EX1019, ¶[0005]. Accordingly, a POSA would have been

a. Element 5d: “a chemical dispenser on, in, or carried by the vehicle body;”

287. Element 5d would have been obvious over Fu in view of Hui.

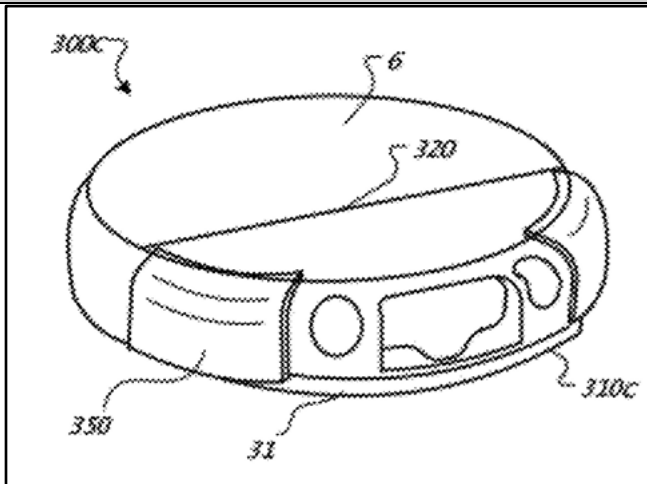
288. Hui’s pool cleaning vehicle discloses a chemical dispenser 30 that may be “on, in, or carried by” the vehicle body. EX1019, ¶[0012], Figs. 2, 8-9. A POSA would have been motivated to combine Hui’s chemical dispenser with Fu’s autonomous pool cleaning robot to provide an improved pool cleaning system capable of both mechanical filtration and chemical sanitization. Both Fu and Hui are directed to the same field: automated pool cleaning robots that filter pool water; both share a common functional architecture: a self-propelled underwater vehicle with inlets, outlets, and an internal water flow path where filtration occurs. EX1007, ¶¶[0024], [0026]; EX1019, ¶¶[0046], [0050]-[0051]. Fu’s pool cleaning robot comprises a drainage mechanism that draws pool water through water inlet 26 into the robot’s water flow channel 24, passes the water through the water flow filter screen 23 to remove debris, and then discharges the filtered water back into the pool. EX1007, ¶¶[0024], [0026].

289. A POSA would recognize that Hui’s chemical dispenser enhances Fu’s robot by adding a sanitization step with a simple modification. It is commonly known by even laymen that removal of debris alone is insufficient to maintain safe swimming conditions. *Id.* In fact, most swimming pools utilize some method of water sanitization to eliminate harmful microorganisms, addition of chlorine being the most common method. *Id.* Hui recognizes this need, explaining that “it is simply not enough for the water to be clean or in other words,

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motivated to incorporate Hui's chemical dispenser 30 into Fu's robot to achieve a predictable improvement—a pool cleaning robot that filters as well as sanitizes pool water. EX1010, ¶¶288-290. As explained by Dr. Reinholtz, a POSA would have had a reasonable expectation of success in combining these references. <i>Id.</i>, ¶290. Fu's robot already provides a water flow path within water flow channel 24, which is analogous to Hui's water flow path. EX1007, ¶¶[0024], [0026]; EX1019, ¶¶[0046], [0050]-[0051]. A POSA could easily integrate Hui's chemical dispenser 30 within Fu's water flow channel 24 such that the filtered water passes through the chemical dispenser before being discharged into the pool. EX1010, ¶290. Alternatively, a POSA could also mount Hui's chemical dispenser 30 externally to Fu's robot as Hui teaches in its embodiments of Figures 8 and 9. <i>Id.</i> Either configuration would expose the pool water to chemical dispenser 30 in the same manner as in Hui, thereby enhancing Fu's robot to perform both cleaning and sanitizing functions. <i>Id.</i> Accordingly, Fu in view of Hui renders obvious element 5d's "a chemical dispenser [Hui's chemical dispenser 30] on, in, or carried by the vehicle body [robot housing body 1]." Claim 5 would have been obvious over Fu in view of Hui. <i>Id.</i>, ¶¶284-292.	relatively free of dirt and debris, it must be sanitary." EX1019, ¶[0005]. Accordingly, a POSA would have been motivated to incorporate Hui's chemical dispenser 30 into Fu's autonomous pool cleaning robot to achieve a predictable improvement—a pool cleaning robot that filters as well as sanitizes pool water. 290. A POSA would have had a reasonable expectation of success in combining these references. Fu's robot already provides a water flow path within the water flow channel 24, which is analogous to Hui's water flow path. EX1007, ¶¶[0024], [0026]; EX1019, ¶¶[0046], [0050]-[0051]. A POSA could easily integrate Hui's chemical dispenser 30 within Fu's water flow channel 24 such that the filtered water would pass through the chemical dispenser before being discharged into the pool. Alternatively, a POSA could also mount Hui's chemical dispenser 30 externally to the underwater vehicle as Hui teaches in its embodiments of Figures 8 and 9. Either configuration would expose the pool water to the chemical dispenser 30 in the same manner as in Hui, thereby enhancing Fu's robot to perform both cleaning and sanitizing functions. 291. Accordingly, Fu in view of Hui renders obvious element 5d's "a chemical dispenser [Hui's chemical dispenser 30] on, in, or carried by the vehicle body [robot housing body 1]." 292. Claim 5 would have been obvious over Fu in view of Hui.
Section IV.E. E. Ground 1e: Claim 5 Would Have Been Obvious Over Fu In View of Benzler, In Further View Of Hui	Section XII.E. E. Ground 1e: Claim 5 Would Have Been Obvious Over Fu In View of Benzler, In Further View Of Hui

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Claim 5 would have been obvious over Fu and Hui. Section IV.D.2. However, to the extent the Board finds that Fu does not disclose the “at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface,” claim 5 is nonetheless obvious over Fu in view of Benzler, in further view of Hui. EX1010, ¶¶293-294. A POSA would have been motivated to combine Fu and Benzler to yield the control signal for causing movement “to, or away from” a portion of the submerged surface for the reasons explained for Ground 1c. Section IV.C.2. A POSA would further have been motivated to add Hui’s chemical dispenser 30 to the Fu/Benzler robot for the reasons stated in Ground 1d, <i>e.g.</i>, to advantageously enable sanitization of the pool water along with filtration. Section IV.D.2. Claim 5 would have been obvious over Fu in view of Benzler, further in view of Hui. EX1010, ¶¶293-294.	293. Claim 5 would have been obvious over Fu and Hui. <i>See</i> Ground 1d. However, should the Board find that Fu does not disclose the claimed “at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface,” claim 5 is nonetheless obvious over Fu in view of Benzler, in further view of Hui. A POSA would have been motivated to combine Fu and Benzler to yield the claimed control signal for causing movement “to, or away from” a portion of the submerged surface for the reasons explained above for Ground 1c. A POSA would further have been motivated to add Hui’s chemical dispenser 30 to the Fu/Benzler robot for the reasons stated above in Ground 1d, <i>e.g.</i>, to advantageously enable sanitization of the pool water along with filtration. 294. Claim 5 would have been obvious over Fu in view of Benzler, further in view of Hui.
Section IV.F.1. 1. Summary Of Schnittman Schnittman, EX1008, entitled “Debris Monitoring,” was filed December 30, 2011, and published July 5, 2012. EX1008, (22), (43). Schnittman incorporates by reference and claims priority to U.S. Provisional Application No. 61/428,808 (the “’808 provisional”), filed December 30, 2010. <i>Id.</i>, (60). Schnittman is prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (e). Schnittman discloses an autonomous cleaning robot having a debris monitoring system and onboard sensing for navigation and safety. <i>Id.</i>, Abstract, ¶¶[0002], [0004]-[0006].	Section X.B. B. Schnittman 101. Schnittman, EX1008, entitled “Debris Monitoring,” was filed December 30, 2011, and published July 5, 2012. EX1008, (22), (43). Schnittman incorporates by reference and claims priority to U.S. Provisional Application No. 61/428,808 (the “’808 provisional”), filed December 30, 2010. <i>Id.</i>, (60). Schnittman is prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (e). 102. Schnittman discloses an autonomous cleaning robot having a debris monitoring system and onboard sensing for navigation and safety. <i>Id.</i>, Abstract, ¶¶[0002], [0004]-[0006].

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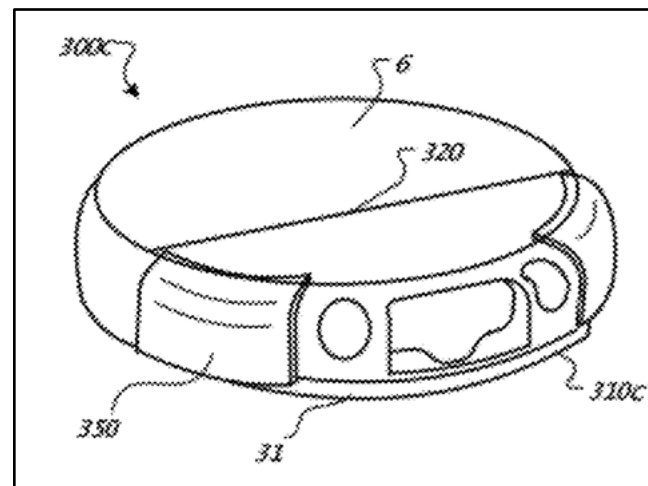


Id., Fig. 3C (example cleaning robot). Embodiments of Schnittman's cleaning robot include a drive assembly, cleaning assemblies, and a sensor suite, enabling behaviors such as debris-dependent spot cleaning, edge/cliff avoidance, and autonomous return to a maintenance/charging station. *Id.*, Fig. 2; ¶¶[0113], [0118]-[0119], [0191]-[0203], [0216]-[0227].

In embodiments, Schnittman's cleaning robot further includes a microprocessor 245 that executes routines and issues control signals to move the robot (*id.*, ¶¶[0118]-[0119]):

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An example of Schnittman's autonomous cleaning robots is depicted in Figure 3C:



Id., Fig. 3C.

103. Embodiments of Schnittman's cleaning robot include a drive assembly, cleaning assemblies, and a sensor suite, enabling behaviors such as debris-dependent spot cleaning, edge/cliff avoidance, and autonomous return to a maintenance/charging station. *Id.*, Fig. 2; ¶¶[0113], [0118]-[0119], [0191]-[0203], [0113], [0216]-[0227].

104. In embodiments, Schnittman's cleaning robot further includes a dedicated microprocessor 245 that executes routines and issues control signals to move the robot (*id.*, ¶¶[0118]-[0119]):

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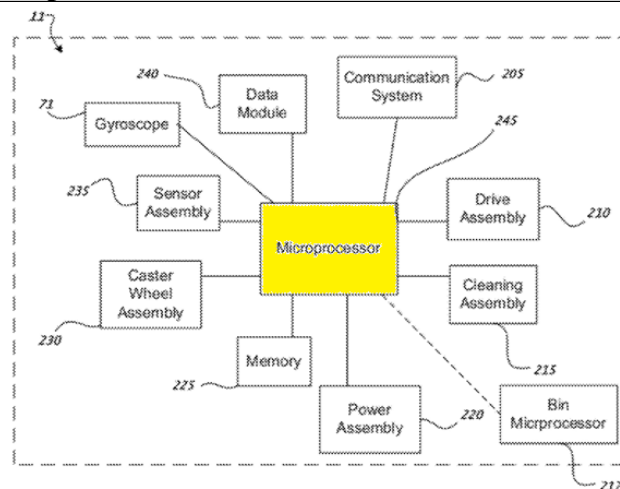


FIG. 2

Id., Fig. 2.

Additionally, “in some implementations, the robot 11 includes a camera 1190 disposed toward the forward portion of the robot 11, with a field of view beyond the perimeter of the robot 11” (*id.*, ¶[0204]):

106. Schnittman further discloses that “in some implementations, the robot 11 includes a camera 1190 disposed toward the forward portion of the robot 11, with a field of view beyond the perimeter of the robot 11” (*id.*, ¶[0204]):

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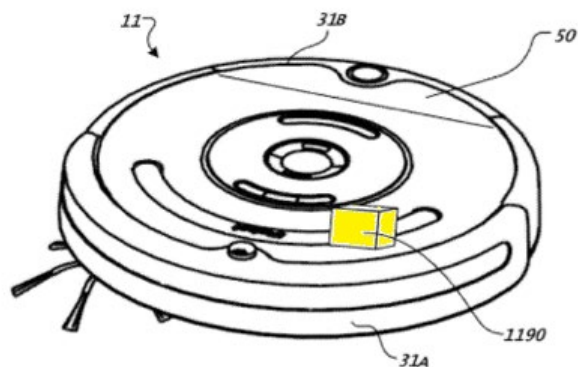


FIG. 11

Id., Fig. 11; *see also id.*, ¶[0045] (“In some implementations, the debris sensor includes a camera directed substantially forward of the cleaning apparatus. In certain implementations, the camera is movable to scan an area substantially forward of the cleaning apparatus.”). Camera 1190 is “in communication with the microprocessor 245,” which controls the robot based on signals received from the camera. *Id.*, ¶[0204].

Schnittman is analogous art to the '766 Patent because (1) it is from the same field of endeavor as the '766 Patent, and (2) it is reasonably pertinent to the problem faced by the inventors of the '766 Patent. EX1010, ¶109; *see Airbus S.A.S. v. Firepass Corp.*, 941 F.3d 1374, 1379 (Fed. Cir. 2019).

First, the '766 Patent and Schnittman are in the same field of endeavor: autonomous cleaning robots. *Compare* EX1003, 1:24-29 (automated, robotic cleaners for cleaning surfaces) *with* EX1008, ¶¶[0002]-[0003] (“This application relates to robots, and more particularly to autonomous coverage robots” for “removing

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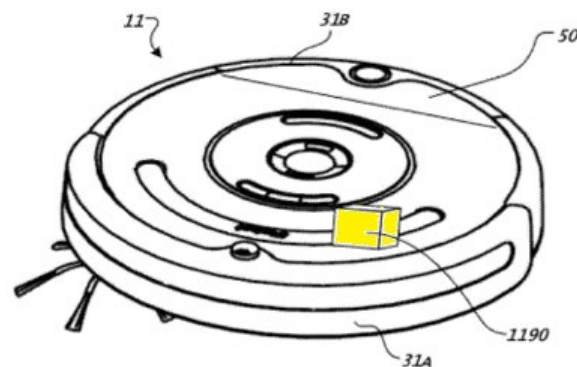


FIG. 11

Id., Fig. 11.

107. Further, “[i]n some implementations, the debris sensor includes a camera directed substantially forward of the cleaning apparatus. In certain implementations, the camera is movable to scan an area substantially forward of the cleaning apparatus.” *Id.*, ¶[0045].

108. The camera 1190 is “in communication with the microprocessor 245,” such that “movement of the robot 11 over the cleaning surface can be based at least in part on the detection of debris and/or an obstacle by the camera 1190.” *Id.*, ¶[0204]. For example, “the microprocessor 245 can process the signal from the camera 1190 to recognize debris on the cleaning surface and maneuver the robot 11 toward the debris.” *Id.*

109. Schnittman is analogous art to the challenged patents because (1) it is from the same field of endeavor as the challenged patents, and (2) it is reasonably pertinent to the

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debris from a surface.”). <i>Second</i>, Schnittman is reasonably pertinent to at least one problem purportedly addressed by the '766 Patent: ensuring “that all portions of ... pool surfaces are satisfactorily cleaned.” EX1003, 1:24-29. Schnittman describes adaptive cleaning based on detected debris: In response to an identification of debris on a surface, Schnittman’s autonomous cleaning robot can perform various actions, including altering its path, running spot cleaning patterns, and steering toward the debris. EX1008, Figs. 10A-10B; ¶¶[0024], [0191]-[0203]. This focuses cleaning efforts where they are most necessary and enables better cleaning coverage, thus ensuring satisfactory cleaning of a surface. EX1010, ¶109. A POSA making a debris detecting pool cleaner would have thus “consulted [Schnittman] and applied [its] teachings in seeking a solution to the problem [POSA] was attempting to solve.” <i>Airbus S.A.S.</i>, 941 F.3d at 1382.	problem faced by the inventors of the challenged patents. <i>First</i>, the challenged patents and Schnittman are in the same field of endeavor: autonomous cleaning robots. <i>Compare</i> EX1005, 1:26-2:36 (automated, robotic cleaners for cleaning surfaces) <i>with</i> EX1008, ¶¶[0002]-[0003] (“This application relates to robots, and more particularly to autonomous coverage robots” for “removing debris from a surface.”). <i>Second</i>, Schnittman is reasonably pertinent to at least one problem purportedly addressed by the '207 Patent: ensuring “that all portions of ... pool surfaces are satisfactorily cleaned.” EX1005, 1:26-31. Schnittman describes adaptive cleaning based on detected debris: In response to an identification of debris on a surface, Schnittman’s autonomous cleaning robot can perform various actions, including altering its path, running spot cleaning patterns, and steering toward the debris. EX1008, Figs. 10A-10B; ¶¶[0024], [0191]-[0203]. This focuses cleaning efforts where they are most necessary and enables better cleaning coverage, thus ensuring satisfactory cleaning of a surface.
Section IV.F.5. 5. Claim 2 Claim 2 is unpatentable over Schnittman in view of Benzler for the reasons explained for claim 1. <i>See also</i> Section IV.A.3.	Section XII.F.3. 3. Independent Claim 2 331. Claim 2 is unpatentable over Schnittman in view of Benzler for the reasons explained above for claim 1. <i>See also</i> Section XII.A.2.
Section IV.F.6. 6. Claim 4 Claim 4 is unpatentable over Schnittman in view of Benzler for the reasons explained for claim 1. <i>See also</i> Section IV.A.5.	Section XII.F.4. 4. Independent Claim 4 332. Claim 4 is unpatentable over Schnittman in view of Benzler for the reasons explained above for claim 1. <i>See also</i> Section XII.A.4.

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Section IV.G.1. 1. Summary of Bailey Bailey, EX1018, entitled “User-assisted Robot Navigation System,” was filed on July 14, 2009 as U.S. Patent Application No. 12/502,699, and published on Jan. 29, 2013 as U.S. Patent No. 8,364,309 B1. EX1018, (10), (21), (22), (45), (54). Bailey is therefore prior art under at least pre-AIA 35 U.S.C. § 102(e). Bailey describes a mobile robot 102, such as a room cleaning robot or a pool cleaning robot, that autonomously navigates within a space to perform cleaning tasks, while also allowing user interaction and control through a remote management station 112. EX1018, 1:29-32, 3:46-49, 6:3-7:51, 17:26-29, claim 1. The robot 102 includes a control engine 300 that is an onboard processor implemented as “microprocessors, central processing units (CPUs), or programmable logic devices” “configured to execute computer code or instructions stored in a memory.” <i>Id.</i>, 4:40-42, 5:31-39. The control engine 300 interfaces with the robot’s “sensors, motors, communication facility, and other components of the robot, such that the robot control engine can receive data from the sensors, control the motors, and communicate with the management station 112.” <i>Id.</i>, 5:19-24.	Section X.E. E. Bailey 123. Bailey, EX1018, entitled “User-assisted Robot Navigation System,” was filed on July 14, 2009 as U.S. Patent Application No. 12/502,699, and published on Jan. 29, 2013 as U.S. Patent No. 8,364,309 B1. EX1018, (10), (21), (22), (45), (54). Bailey is therefore prior art under at least pre-AIA 35 U.S.C. § 102(e). 124. Bailey describes a mobile robot 102, such as a room cleaning robot or a pool cleaning robot, that autonomously navigates within a space to perform cleaning tasks, while also allowing user interaction and control through a remote management station 112. EX1018, 1:29-32, 3:46-49, 6:3-7:51, 17:26-29, claim 1. The robot 102 includes a control engine 300 that is an onboard processor implemented as “microprocessors, central processing units (CPUs), or programmable logic devices” “configured to execute computer code or instructions stored in a memory.” <i>Id.</i>, 4:40-42, 5:31-39. The control engine 300 interfaces with the robot’s “sensors, motors, communication facility, and other components of the robot, such that the robot control engine can receive data from the sensors, control the motors, and communicate with the management station 112.” <i>Id.</i>, 5:19-24.
Section IV.G.2. 2. Independent Claim 3 As shown in Ground 1a (Section IV.A.4), claim 3’s preamble and elements 3a-3d are substantially the same as claim 1’s preamble	Section XII.G.1. 1. Independent Claim 3 333. As shown in Ground 1a (Section XII.A.3.), claim 3’s preamble and elements 3a-3d are substantially the same as claim

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and elements 1a-1d. Therefore, the preamble and elements 3a-3d are obvious over Schnittman in view of Benzler for the reasons explained in Ground 2a. Section IV.F.4. (a) Element 3e: Element 3e is obvious over Schnittman in view of Benzler for the reasons explained for element 1e. EX1010, ¶334; Section IV.F.4.f. (b) Element 3f: Element 3f is obvious over Schnittman in view of Benzler, in further view of Bailey. EX1010, ¶¶335-343. For the reasons explained for element 1f, Schnittman makes obvious the controller (microprocessor 245) “in electronic communication with the at least one camera [camera 1190].” <i>Id.</i>; Section IV.F.4.g. Schnittman’s remote indicator 1202 (EX1008, ¶[0214]) is a “portable electronic device” in “electronic communication with” the controller, as required by element 3f. EX1003, ¶336. In addition, Bailey provides the complementary teaching of “a portable electronic device” “in electronic communication with” the controller. Bailey’s management station 112, which may be implemented as “workstations, desktop computers, laptop computers or other personal computers,” provides a user interface for remotely monitoring and interacting with robot 102. EX1018, 3:23-30, 7:23-51. Management station 112 is remote from robot 102, and it communicates with the onboard control engine 300 through standard technologies such as a “wireless network	1’s preamble and elements 1a-1d. Therefore, the preamble and elements 3a-3d are obvious over Schnittman in view of Benzler for the reasons explained in Ground 2a. Section XII.F.2. a. Element 3e: “a controller (i) positioned on or in the body,” 334. Element 3e of claim 3 is obvious over Schnittman in view of Benzler for the reasons explained above for element 1e of claim 1. Section XII.F.2.f. b. Element 3f: “[the controller] (ii) in electronic communication with the at least one camera and a portable electronic device, and” 335. Element 3f is obvious over Schnittman in view of Benzler, in further view of Bailey. <u>336. For the reasons explained above for element 1f of claim 1, Schnittman makes obvious the claimed controller (microprocessor 245) “in electronic communication with the at least one camera [camera 1190].” Section IV.F.4.g. Further, Schnittman discloses “a portable electronic device” in “electronic communication with” the controller. For example, Schnittman discloses a “remote indicator 1202” that includes “a function button 1210, which transmits a command to the robot 11 when activated. In some examples, the remote indicator 1202 includes an acknowledge button 1212 that transmits an appropriate command signal to the mobile robot 20 when pushed. For example, when a bin-full signal is received, the LCD display 1206 may display a message indicating to the user that the bin is full. The user may then press the button 1212,</u>

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interface card (NIC), an Ethernet-based NIC, a Bluetooth interface or an infra red (IR) interface,” or “a wireless data connection ... 350.” *Id.*, 3:37-40, 7:5-10, Fig. 1.

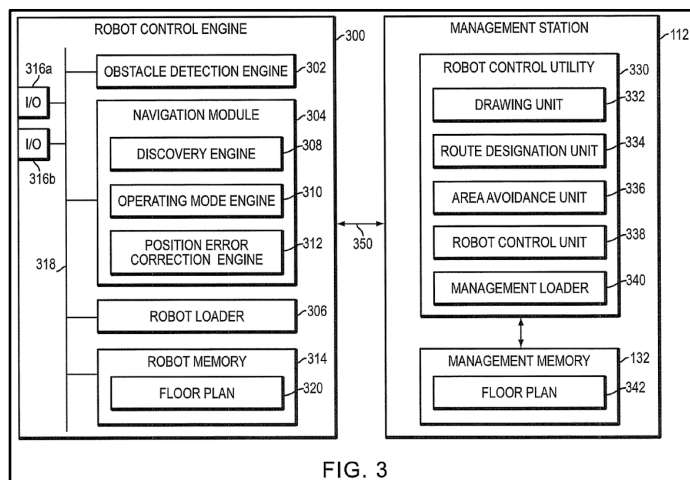


FIG. 3

EX1018, Fig. 3 (showing wireless data connection 350 between the control engine 300 and the management station 112). Bailey further explains that management station 112 may include “a central processing unit (CPU) 130, a memory 132, a display screen 134, one or more input devices, such as keyboard 136 and a mouse 138” that allow a user to interact with robot 102 via a GUI 1400. *Id.*, 3:15-22, 7:23-51. “In an embodiment, the user may direct the motion of the robot 102 in real-time using the robot GUI 1400, as a remote control ... from the management station 112.” *Id.*, 16:26-35. Management station 112 thus enables a user to remotely communicate with robot 102 regarding, for *e.g.*, floor plans, navigation commands, cleaning instructions, etc. *Id.*, 7:3-12, 7:23-51. Bailey further teaches that “a hand-held remote control unit (not shown) may be operated by the user to direct the

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[causing a command to be transmitted to the robot 11 that in turn causes the robot 11 to navigate to a particular location.](#) EX1008, ¶[0214].

337. In addition, Bailey provides the complementary teaching of “a portable electronic device” “in communication with” the controller. Bailey’s management station 112, which may be implemented as “workstations, desktop computers, laptop computers or other personal computers,” provides a user interface for remotely monitoring and interacting with the robot. EX1018, 3:23-30, 7:23-51. The management station 112 is remote from the robot 102, and it communicates with the onboard control engine 300 through standard technologies such as a “wireless network interface card (NIC), an Ethernet-based NIC, a Bluetooth interface or an infra red (IR) interface,” or “a wireless data connection ... 350.” *Id.*, 3:37-40, 7:5-10, Fig. 1.

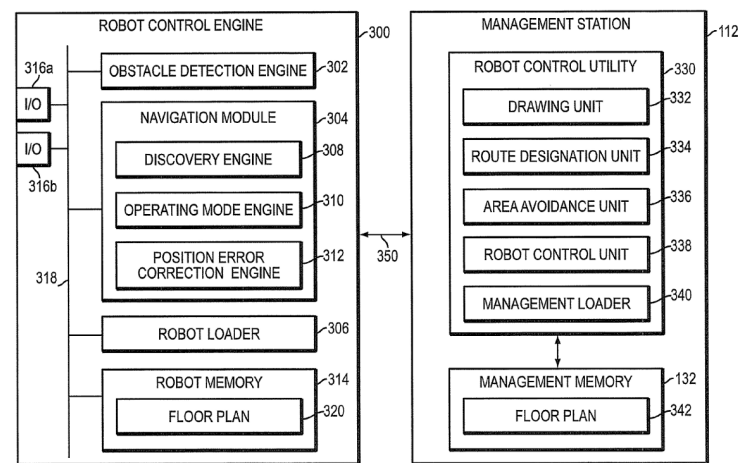


FIG. 3

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motion of the robot 102,” emphasizing the portability and remote nature of management station 112. <i>Id.</i>, 16:26-35 Bailey’s management station 112 thus discloses the “portable electronic device” that is “in electronic communication with” “a controller.” A POSA would have been motivated to apply Bailey’s management station 112 to the Schnittman/Benzler image-based underwater pool cleaner. Like Schnittman and Benzler, Bailey discloses an autonomous cleaning robot that navigates the cleaning space, such as a swimming pool, using sensor-based perception and an onboard control engine. EX1018, 1:29-32, 3:46-49, 3:51-4:25, 9:48-65, 17:26-29. Bailey’s additional teaching of a portable, remote user interface provides a complementary feature that enables user interaction, monitoring, and real-time control—functionalities that would have been naturally desirable to extend to an autonomous pool cleaning robot. Combining Bailey with the Schnittman/Benzler pool cleaning robot would therefore have yielded a predictable and advantageous configuration: an image-guided, autonomous pool cleaning robot whose onboard controller communicates with a portable electronic device (Bailey’s management station 112) for user monitoring and control. As explained by Dr. Reinholtz, a POSA would have recognized the clear advantages of this combination. EX1010, ¶340. Bailey demonstrates that providing a remote management interface allows for convenient user input, remote monitoring, and real-time user control of the robot’s navigation and cleaning. These advantages would have been particularly beneficial in the underwater pool cleaning context, where direct physical access to the robot or its onboard controls is impractical once the robot is submerged. For example, a user might wish to initiate or pause a	EX1018, Fig. 3 (showing wireless data connection 350 between the control engine 300 and the management station 112). 338. Bailey further explains that the management station 112 may include “a central processing unit (CPU) 130, a memory 132, a display screen 134, one or more input devices, such as keyboard 136 and a mouse 138” that allow a user to interact with the robot 102 via a GUI 1400. <i>Id.</i>, 3:15-22, 7:23-51. “In an embodiment, the user may direct the motion of the robot 102 in real-time using the robot GUI 1400, as a remote control ... from the management station 112.” <i>Id.</i>, 16:26-35. The management station 112 thus enables a user to remotely communicate with the robot 102 regarding, for <i>e.g.</i>, floor plans, navigation commands, cleaning instructions, etc. <i>Id.</i>, 7:3-12, 7:23-51. Bailey further teaches that “a hand-held remote control unit (not shown) may be operated by the user to direct the motion of the robot 102,” emphasizing the portability and remote nature of the management station 112. <i>Id.</i>, 16:26-35 339. Bailey’s management station 112 thus discloses the claimed “portable electronic device [management station 112]” that is “in electronic communication with” “a controller.” A POSA would have been motivated to apply Bailey’s management station 112 to the Schnittman/Benzler image-based underwater pool cleaner. Like Schnittman and Benzler, Bailey discloses an autonomous cleaning robot that navigates the cleaning space, such as a swimming pool, using sensor-based perception and an onboard control engine. EX1014, 1:29-32, 3:46-49, 3:51-4:25, 9:48-65, 17:26-29. Bailey’s additional teaching of a portable, remote user interface provides a complementary feature that enables user interaction, monitoring, and real-time control—functionalities that would have been

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cleaning cycle, redirect the robot to an uncleaned area, or retrieve diagnostic information if anything goes wrong, all of which are functions that could be conveniently performed through Bailey's management station 112. Furthermore, Bailey explicitly references multiple iRobot cleaning platforms (<i>e.g.</i>, Roomba®, Home Base®, Create®) as suitable and known mobile robot implementations. EX1018, 1:11-16, 3:41-45, 4:53-58. Because iRobot is also the assignee of Schnittman, a POSA would have understood Bailey's and Schnittman's teachings as complementary and compatible technologies arising from the same field of autonomous cleaning robotics. This cross-reference would have reinforced a POSA's expectation that Bailey's management station 112 could be readily applied to Schnittman's image-based cleaning robot, including when adapted for a pool environment as taught by Benzler, particularly since Bailey itself states that the mobile robot 102 may be implemented as a pool cleaning robot. EX1018, 17:26-29. As explained by Dr. Reinholtz, a POSA would have had a reasonable expectation of success in combining these references. EX1010, ¶342. By 2012, remote communication between a robot and a portable device was routine and well established, using mature technologies such as Bluetooth, wireless network, or infrared interfaces, all of which Bailey discloses. <i>Id.</i> Implementing Bailey's management station 112 into the Schnittman/Benzler device would have required only conventional hardware and software integration, well within the skill of a POSA. <i>Id.</i> The necessary adaptations for underwater use, such as waterproofing and sealing, were likewise straightforward engineering tasks known to POSA. <i>Id.</i>	naturally desirable to extend to an autonomous pool cleaning robot. Combining Bailey with the Schnittman/Benzler pool cleaning robot would therefore have yielded a predictable and advantageous configuration: an image-guided, autonomous pool cleaning robot whose onboard controller communicates with a portable electronic device (Bailey's management station 112) for user monitoring and control. 340. A POSA would have recognized the clear advantages of this combination. Bailey demonstrates that providing a remote management interface allows for convenient user input, remote monitoring, and real-time user control of the robot's navigation and cleaning. These advantages would have been particularly beneficial in the underwater pool cleaning context, where direct physical access to the robot or its onboard controls is impractical once the robot is submerged. For example, a user might wish to initiate or pause a cleaning cycle, redirect the robot to an uncleaned area, or retrieve diagnostic information if anything goes wrong, all of which are functions that could be conveniently performed through Bailey's management station 112. 341. Furthermore, Bailey explicitly references multiple iRobot cleaning platforms (<i>e.g.</i>, Roomba®, Home Base®, Create®) as suitable and known mobile robot implementations. EX1018, 1:11-16, 3:41-45, 4:53-58. Because iRobot is also the assignee of Schnittman, a POSA would have understood Bailey's and Schnittman's teachings as complementary and compatible technologies arising from the same field of autonomous cleaning robotics. This cross-reference would have reinforced a POSA's expectation that Bailey's management station 112 could be readily applied to Schnittman's image-based cleaning robot,

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Accordingly, Schnittman in view of Benzler, in further view of Bailey makes obvious the controller (microprocessor 245) “in electronic communication with the at least one camera [camera 1190] and a portable electronic device [management station 112].” <i>Id.</i>, ¶¶335-343. (c) Element 3g: Element 3g is obvious over Schnittman in view of Benzler, in further view of Bailey. <i>Id.</i>, ¶¶344-348. For the reasons explained for element 1g, Schnittman in view of Benzler makes obvious that the controller (microprocessor 245) is “configured to generate, in response to at least one of the captured image ..., at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface.” Section IV.F.4.h. As explained for element 3f, Bailey further teaches that its management station 112, which is in communication with the onboard control engine 300, allows a user to interact with and control the cleaning robot. EX1018, 7:5-10, 16:26-35 (“the user may direct the motion of the robot 102 in real-time using the robot GUI 1400 [on management station 112], as a remote control”), Figs. 1, 3. A user may direct the robot in real time through management station 112, <i>i.e.</i>, the portable electronic device, with those directions being transmitted to the control engine 300 wirelessly and being used to control the robot accordingly. <i>Id.</i>, 3:37-40, 7:5-10, 7:23-51, 16:26-35. Therefore, Schnittman in view of Benzler, in further view of	including when adapted for a pool environment as taught by Benzler, particularly since Bailey itself states that the mobile robot 102 may be implemented as a pool cleaning robot. EX1014, 17:26-29. 342. A POSA would have had a reasonable expectation of success in combining these references. By 2012, remote communication between a robot and a portable device was routine and well established, using mature technologies such as Bluetooth, wireless network, or infrared interfaces, all of which Bailey discloses. Implementing Bailey’s management station 112 into the Schnittman/Benzler device would have required only conventional hardware and software integration, well within the skill of a POSA. The necessary adaptations for underwater use, such as waterproofing and sealing, were likewise straightforward engineering tasks known to POSA. 343. Accordingly, Schnittman in view of Benzler, in further view of Bailey makes obvious the claimed controller (microprocessor 245) “in electronic communication with the at least one camera [camera 1190] and a portable electronic device [management station 112].” c. Element 3g: “[the controller] (iii) configured to generate, in response to at least one of the captured image or information from the portable electronic device, at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface.” 344. Element 3g is obvious over Schnittman in view of Benzler, in further view of Bailey.

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Bailey, discloses that the controller (microprocessor 245) is “configured to generate, in response to at least one of the captured image [image captured by camera 1190] or information from the portable electronic device [management station 112], at least one control signal to cause movement of the body [robot body 31] within the swimming pool to, or away from, the first portion of the submerged surface.” Thus, claim 3 would have been obvious over Schnittman in view of Benzler, in further view of Bailey. EX1010, ¶¶333-348.	345. For the reasons explained above for element 1g of claim 1, Schnittman in view of Benzler makes obvious that the controller (microprocessor 245) is “configured to generate, in response to at least one of the captured image ..., at least one control signal to cause movement of the body within the swimming pool to, or away from, the first portion of the submerged surface.” Section XII.F.2.h. 346. As explained for element 3f, Bailey further teaches that its management station 112, which is in communication with the onboard control engine 300, allows a user to interact with and control the cleaning robot. EX1018, 7:5-10, 16:26-35 (“the user may direct the motion of the robot 102 in real-time using the robot GUI 1400 [on management station 112], as a remote control”), Figs. 1, 3. A user may direct the robot in real time through the management station 112, <i>i.e.</i>, the portable electronic device, with those directions being transmitted to the control engine 300 wirelessly and being used to control the robot accordingly. <i>Id.</i>, 3:37-40, 7:5-10, 7:23-51, 16:26-35. 347. Therefore, Schnittman in view of Benzler, in further view of Bailey, discloses that the controller (microprocessor 245) is “configured to generate, in response to at least one of the captured image [image captured by camera 1190] or information from the portable electronic device [management station 112], at least one control signal to cause movement of the body [robot body 31] within the swimming pool to, or away from, the first portion of the submerged surface.” 348. Thus, claim 3 would have been obvious over Schnittman in view of Benzler, in further view of Bailey.
Section IV.H.1.	Section XII.H.1.

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H. Ground 2c: Claim 5 Would Have Been Obvious Over Schnittman In View Of Benzler, In Further View Of Hui 1. Independent Claim 5 As shown in Ground 1d, claim 5's preamble, and elements 5a-5c and 5e-5f are substantially the same as claim 1's preamble, and elements 1a-1g. Section IV.D.2 Therefore, claim 5's preamble and elements 5a-5c and 5e-5f are obvious over Schnittman in view of Benzler for the reasons explained in Ground 2a. Section IV.F.4. Claim 5 additionally recites element 5d, analyzed below. (a) Element 5d: Element 5d would have been obvious over Schnittman in view of Benzler, further in view of Hui. EX1010, ¶¶351-355. Hui's pool cleaning vehicle discloses a chemical dispenser 30 that may be "on, in, or carried by" the vehicle body. Section IV.D.1. A POSA would have been motivated to combine Hui's chemical dispenser with the Schnittman/Benzler image-based underwater pool cleaner to provide an improved automated pool cleaning system capable of performing both mechanical filtration and chemical sanitization. EX1010, ¶352. Like the Schnittman/Benzler device, Hui is also directed to automated pool cleaning robots. EX1019, Abstract, ¶[0001]. When adapting Schnittman's cleaning robot for underwater operation as taught by Benzler, a POSA would know that adding a chemical-dispenser function, specifically for swimming pool environments, is a	H. Ground 2c: Claim 5 Would Have Been Obvious Over Schnittman In View Of Benzler, In Further View Of Hui 1. Independent Claim 5 349. As shown in Ground 1d, claim 5's preamble, and elements 5a-5c and 5e-5f are substantially the same as claim 1's preamble, and elements 1a-1g. Section XII.D.1. Therefore, claim 5's preamble and elements 5a-5c and 5e-5f are obvious over Schnittman in view of Benzler for the reasons explained in Ground 2a. Section XII.F.2. 350. Claim 5 additionally recites element 5d, analyzed below. a. Element 5d: "a chemical dispenser on, in, or carried by the vehicle body;" 351. Element 5d would have been obvious over Schnittman in view of Benzler, further in view of Hui. 352. As explained above, Hui's pool cleaning vehicle discloses a chemical dispenser 30 that may be "on, in, or carried by" the vehicle body. Section X.D. A POSA would have been motivated to combine Hui's chemical dispenser with the Schnittman/Benzler image-based underwater pool cleaner to provide an improved automated pool cleaning system capable of performing both mechanical filtration and chemical sanitization. Like the Schnittman/Benzler device, Hui is also directed to automated pool cleaning robots. EX1019, Abstract, ¶[0001]. When adapting Schnittman's cleaning robot for underwater operation as taught by Benzler, a POSA would know that adding

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predictable step. EX1010, ¶352. A POSA would naturally incorporate a known chemical-dispensing element into the Schnittman/Benzler autonomous pool cleaning device because pool sanitation using chemicals, such as chlorine, has been widely known and implemented since before the '766 Patent. <i>Id.</i> A POSA would therefore recognize that Hui's chemical dispenser enhances the Schnittman/Benzler system by adding a known and desirable sanitization function through a straightforward modification. As explained by Dr. Reinholtz, a POSA would have had a reasonable expectation of success in combining these references. EX1010, ¶353. Hui teaches that its chemical dispenser 30 may be mounted externally on the robot body, as illustrated in the embodiments of Figures 8 and 9. EX1019, Figs. 8-9. A POSA could therefore add Hui's chemical dispenser to the exterior of the Schnittman/Benzler device without altering the underlying architecture of the device. Simply mounting the chemical dispenser to the housing would expose the chemical dispenser to the pool water in the same manner as taught by Hui. EX1010, ¶353. Alternatively, Hui also teaches that the chemical dispenser may be integrated within the robot body. Incorporating the chemical dispenser in this manner with the Schnittman/Benzler device would likewise have been a routine modification well within a POSA's skillset. <i>Id.</i>, ¶354. As explained above, at the time of the '766 Patent, pool cleaners incorporating chemical-dispensing components (<i>e.g.</i>, chlorine) were well-known and widely used. Thus, adding Hui's chemical dispenser, whether internally or externally, would require only a straightforward application of known methods.	a chemical-dispenser function, specifically for swimming pool environments, is a predictable step. A POSA would naturally incorporate a known chemical-dispensing element into the Schnittman/Benzler autonomous pool cleaning device because pool sanitation using chemicals, such as chlorine, has been widely known and implemented since before the '766 Patent. A POSA would therefore recognize that Hui's chemical dispenser enhances the Schnittman/Benzler system by adding a known and desirable sanitization function through a straightforward modification. 353. A POSA would have had a reasonable expectation of success in combining these references. Hui teaches that its chemical dispenser 30 may be mounted externally on the robot body, as illustrated in the embodiments of Figures 8 and 9. EX1019, Figs. 8-9. A POSA could therefore add Hui's chemical dispenser to the exterior of the Schnittman/Benzler device without altering the underlying architecture of the device. Simply mounting the chemical dispenser to the housing would expose the chemical dispenser to the pool water in the same manner as taught by Hui. 354. Alternatively, Hui also teaches that the chemical dispenser may be integrated within the robot body. Incorporating the chemical dispenser in this manner with the Schnittman/Benzler device would likewise have been a routine modification well within a POSA's skillset. As explained above, at the time of the '766 Patent, pool cleaners incorporating chemical-dispensing components (<i>e.g.</i>, chlorine) were well-known and widely used. Thus, adding Hui's chemical dispenser, whether internally or externally, would require only a straightforward application of known methods.

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Accordingly, Schnittman in view of Benzler, in further view of Hui renders obvious element 5d's "chemical dispenser [chemical dispenser 30] on, in, or carried by the vehicle body [robot body 31]." Schnittman in view of Benzler, further in view of Hui renders obvious claim 5. <i>Id.</i>, ¶¶349-356.	355. Accordingly, Schnittman in view of Benzler, in further view of Hui renders obvious element 5d's "chemical dispenser [chemical dispenser 30] on, in, or carried by the vehicle body [robot body 31]." 356. Schnittman in view of Benzler, further in view of Hui renders obvious claim 5.