

Kyle R. Canavera, Bar No. 314664
KCanavera@perkinscoie.com
John D. Esterhay, Bar No. 282330
JEsterhay@perkinscoie.com
Wei Yuan, Bar No. 315388
WYuan@perkinscoie.com

PERKINS COIE LLP

11452 El Camino Real, Ste 300
San Diego, California 92130-2080
Telephone: +1.858.720.5700
Facsimile: +1.858.720.5799

Attorneys for Plaintiffs
Beatbot Technology (USA) Co. Ltd.,
Deepwater Innovation Technology
(Hong Kong) Limited, Xingmai
Innovation Technology (Suzhou) Co.,
Ltd.

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF CALIFORNIA

BEATBOT TECHNOLOGY (USA)
CO. LTD., DEEPWATER
INNOVATION TECHNOLOGY
(HONG KONG) LIMITED, and
XINGMAI INNOVATION
TECHNOLOGY (SUZHOU) CO.,
LTD.,

Plaintiffs,

v.

ZODIAC POOL SYSTEMS LLC,
Defendant.

Case No. 3:25-cv-01946-GPC-JLB

**BEATBOT'S MOTION TO
DISMISS**

Date: May 22, 2026
Time: 1:30 p.m.
Courtroom: 12A, 12th Floor
Judge: Hon. Gonzalo P. Curiel

NOTICE OF MOTION AND MOTION

TO ALL PARTIES AND THEIR COUNSEL OF RECORD:

Please take notice that on May 22, 2026, or as soon thereafter as the matter may be heard in the United States District Court for the Southern District of California, Plaintiffs and Counter-Defendants Beatbot Technology (USA) Co., Ltd., Deepwater Innovation Technology (Hong Kong) Limited, and Xingmai Innovation Technology (Suzhou) Co., Ltd. (collectively, “Beatbot”) will and do hereby move this Court pursuant to Federal Rule of Civil Procedure 12(c) for Judgment on the Pleadings.

Beatbot moves for an entry of judgment that all asserted claims of U.S. Patent Nos. 11,003,191; 11,262,766; and 11,880,207 (collectively, the “Zodiac Patents”) are invalid under 35 U.S.C. § 101. Accordingly, Beatbot requests that the Court dismiss with prejudice Defendant Zodiac Pool Systems LLC’s (“Zodiac”) Counterclaims for infringement of the Zodiac Patents (Counterclaim Counts I, II, and III).

This Motion is based on this Notice of Motion, the Memorandum of Points and Authorities, all other pleadings, papers, documents, and records on file with the Court and evidence or arguments that may be requested by the Court.

Dated: March 6, 2026

PERKINS COIE LLP

By: /s/ Kyle R. Canavera

Kyle R. Canavera, Bar No. 314664

KCanavera@perkinscoie.com

John D. Esterhay, Bar No. 282330

JEsterhay@perkinscoie.com

Wei Yuan, Bar No. 315388

WYuan@perkinscoie.com

Attorneys for Plaintiffs *Beatbot
Technology (USA) Co. Ltd., Deepwater
Innovation Technology (Hong Kong)
Limited, And Xingmai Innovation
Technology (Suzhou) Co., Ltd.*

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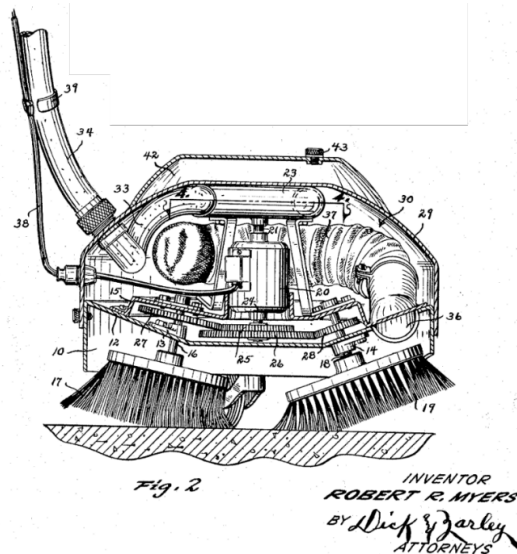
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MEMORANDUM OF POINTS AND AUTHORITIES

I. INTRODUCTION

For decades, pool owners have performed the mundane, abstract task of monitoring a pool and reacting to what they see. A human stands by the water, uses her eyes (sensors) to identify a leaf or a dirty spot (detecting a characteristic), and moves a vacuum or net to that location (generating a control response). This process of observation, evaluation, and response is a fundamental human mental process that long predates the digital age.

Even the automation of this task is nothing new. As evidenced by U.S. Patent No. 3,321,787 (right), since at least 1967—over 40 years before the Zodiac Patents—“automated robotic pool cleaners” have roamed swimming pools, relieving humans of this “tedious and time-consuming task.” By 2001, robotic vacuums like the Electrolux Trilobite were already using sensors to “see” obstacles and “calculate a new path” in unstructured environments.¹ And by 2009, computer vision was already “standard equipment” on underwater vehicles used for navigation and survey tasks.²



Despite this long history of automated cleaners and vision-based navigation, Zodiac now seeks to monopolize the abstract idea of monitoring and controlling a pool cleaner. The asserted claims take the abstract loop of receiving images, detecting

¹ Electrolux Press Release, “World’s first automatic vacuum cleaner” (Nov. 7, 2001), accessible at news.cision.com/electrolux-group/r/world-s-first-automatic-vacuum-cleaner-soon-in-shops,c50625.

² “Computer Vision Applications in the Navigation of Unmanned Underwater Vehicles,” of a monograph, “Underwater Vehicles,” the chapter being written by Jonathan Horgan and Daniel Toal and published by IntechOpen on January 1, 2009, downloadable from <https://www.intechopen.com/chapters/6213#>.

1 a characteristic, and generating a response and merely perform it using generic, off-
2 the-shelf hardware (a “camera” and a “controller”).

3 But 35 U.S.C. § 101 prohibits patenting abstract ideas, including the
4 automation of human mental processes using generic computer components. Because
5 the Zodiac Patents fail the Supreme Court’s *Alice* test and violate this prohibition,
6 Beatbot respectfully requests that the Court find the asserted claims ineligible for
7 patenting and grant judgment on the pleadings in Beatbot’s favor.

8 **II. FACTUAL BACKGROUND**

9 **A. The Zodiac Patents share a common specification and focus on 10 automating pool monitoring and cleaning.**

11 The asserted patents—U.S. Patent Nos. 11,003,191 (“the ’191 patent”),
12 11,262,766 (“the ’766 patent”), and 11,880,207 (“the ’207 patent”) (collectively, the
13 “Zodiac Patents”)—all belong to the same patent family and share the same figures
14 and substantially same specification. The Zodiac Patents generally relate to a “pool
15 cleaning system” that uses “imagery of the pool surface” to “direct movement of the
16 cleaner” or “determine a control action” for pool equipment. ’207 Patent, 1:35–50;
17 ’766 Patent, 1:34–48; ’191 Patent, 1:33–47.

18 Zodiac currently asserts claims 1–3 of the ’191 patent and claims 1–5 of the
19 ’766 patent, all of which are independent. Zodiac also asserts claims 1–3, 5–8, 12–
20 14, and 19 of the ’207 patent, among which claims 1, 2, and 12 are independent.

21 The specification acknowledges that while “[m]anually cleaning the floor and
22 sides of a swimming pool may be a tedious and time-consuming task,” “automated
23 robotic pool cleaners *have been developed*.” ’207 Patent, 1:26–28 (emphasis added).³
24 The purported goal of the patents is to improve the “controlling and monitoring [of]
25 such automated robotic pool cleaners.” *Id.*, 1:29–30.

26 To achieve this, the specification describes a high-level functional loop: (1) a
27 camera captures images of a pool; (2) a controller receives the images; and (3) the

28 ³ A copy of the ’207 patent is attached to this Motion in the accompanying declaration.

1 controller “determines” a cleanliness characteristic or a “control action” to steer a
2 robot. *Id.*, 1:35–50. The specification admits the hardware involved can be entirely
3 conventional, noting the system utilizes “*pre-existing cameras* provided as part of a
4 security system.” *Id.*, 4:5–9 (emphasis added). The “vehicle” can be a “robotic or
5 automated pool cleaning device” with conventional “drive motors,” “rotating
6 brushes,” “suction devices,” and “filter bags.” *Id.*, 10:11–30.

7 The specification also describes the “controller” in generic terms. It explains
8 that its controller “comprises one or more processing units” and the term “processing
9 unit” refers to any “presently developed or future developed processing unit that
10 executes sequences of instructions contained in a memory.” ’207 Patent, 4:18–23.
11 The specification further clarifies that the controller “is not limited to any specific
12 combination of hardware circuitry and software.” *Id.*, 4:33–36.

13 **B. Claim 12 of the ’207 Patent is Representative of the Monitoring**
14 **Claims.**

15 The exemplary claims of the Zodiac Patents are representative of all asserted
16 claims for purposes of eligibility. *Clear Imaging Rsch. LLC v. Google LLC*, No. 25-
17 cv-00221, 2025 WL 3496694, at *11 (S.D. Cal. Dec. 4, 2025) (“*Clear Imaging II*”)
18 (quoting *Mobile Acuity Ltd. v. Blippar Ltd.*, 110 F.4th 1280, 1290 (Fed. Cir. 2024)).

19 Claim 12 of the ’207 patent (the “Monitoring Claim”) is representative of the
20 claims directed to the general monitoring of a pool system. It recites a “method for
21 monitoring a pool system” comprising three purely functional steps:

- 22 1. “receiving images” from one or more cameras;
- 23 2. “determining a target area and detecting a characteristic” based on the
24 images; and
- 25 3. “generating a control response” based on that detected characteristic.

26 ’207 Patent, 11:42–12:4. The Monitoring Claim does not specify any particular
27 image-processing algorithm, mathematical transformation, or technical improvement
28 to the camera or pool equipment.

C. Claim 1 of the '207 Patent is Representative of the Cleaner Claims.

Claim 1 of the '207 patent (the "Cleaner Claim") is representative of the claims directed to a pool cleaner. Like the Monitoring Claim, the Cleaner Claim relies on the same abstract logic but appends the result to a physical vehicle. It recites a system comprising:

1. a "vehicle body," "means for moving," and a "filter";
2. a "camera" for "capturing an image"; and
3. a "controller" configured to "generate, in response to the captured image, at least one control signal to cause movement of the body . . . to, or away from" a portion of the pool or an object.

'207 Patent, 11:42–12:4.

A comparison of claim 1 of the '207 patent and representative claims of the '766 and '191 patents is provided below.

'207 Patent	'766 Patent	'191 Patent
1. A self-propelled pool cleaning system for cleaning debris from a submerged surface of a swimming pool, comprising:	1. A self-propelled pool cleaner for cleaning debris from a submerged surface of a swimming pool, comprising:	1. A self-propelled pool cleaner for cleaning debris from a submerged surface of a swimming pool, comprising:
a. a vehicle body;	a. a vehicle body;	a. a vehicle body;
b. means for moving the vehicle body within the swimming pool;	b. means for moving the vehicle body within the swimming pool;	b. means for moving the vehicle body within the swimming pool;
c. a filter configured to retain debris collected from the submerged surface;	c. a filter configured to retain debris collected from the submerged surface;	c. a filter configured to retain debris collected from the submerged surface;
d. at least one camera for capturing an image of at least a first object within the swimming pool; and	d. at least one camera <i>mounted directly or indirectly to the body</i> for capturing an image of <i>at least a first portion of the submerged surface</i> ; and	d. at least one camera <i>positioned on or in the body</i> for capturing an image of <i>at least a first portion of the submerged surface</i> ; and

'207 Patent	'766 Patent	'191 Patent
e. a controller (i) in electronic communication with the at least one camera and (ii) 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 object.	e. a controller (i) <i>positioned on or in the body</i> , (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, <i>the first portion of the submerged surface</i> .	e. a controller (i) <i>positioned on or in the body</i> , (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, <i>the first portion of the submerged surface</i> .

The Cleaner Claim is similarly result-oriented. It recites physical components of a standard pool robot—a body, wheels, and a filter—and adds the abstract instruction to move “to, or away from” an object based on an image. It fails to identify *how* the controller identifies debris or *how* the navigation signal is calculated.

III. LEGAL STANDARD

A. Patent eligibility is appropriately resolved on the pleadings.

Ninth Circuit procedural law for Rule 12(c) motions applies here. *Imation Corp. v. Koninklijke Philips Elecs. N.V.*, 586 F.3d 980, 984 (Fed. Cir. 2009). A Rule 12(c) motion is reviewed using the same standard as a Rule 12(b) motion, *Dworkin v. Hustler Mag., Inc.*, 867 F.2d 1188, 1192 (9th Cir. 1989), meaning the court “accept[s] factual allegations in the complaint as true and construe[s] the pleadings in the light most favorable to the nonmoving party.” *Manzarek v. St. Paul Fire & Marine Ins. Co.*, 519 F.3d 1025, 1031 (9th Cir. 2008) (citation omitted). Although the court is generally limited to the contents of the pleadings, it may also consider materials subject to judicial notice or incorporation by reference. *Khoja v. Orexigen Therapeutics, Inc.*, 899 F.3d 988, 998 (9th Cir. 2018).

1 Courts routinely evaluate whether the claims of an asserted patent are patent-
2 ineligible under § 101 at the pleadings stage. *See, e.g., Mobile Acuity*, 110 F.4th at
3 1285; *Univ. of Fla. Rsch. Found. v. GE Co.*, 916 F.3d 1363 (Fed. Cir. 2019); *Clear*
4 *Imaging Rsch. LLC v. Google LLC*, 790 F. Supp. 3d 948, 964 (S.D. Cal. 2025) (J.
5 Curiel) (“*Clear Imaging I*”); *Clear Imaging II*, 2025 WL 3496694, at *14 (J. Curiel).

6 **B. Claims are ineligible for patenting under 35 U.S.C. § 101 if they**
7 **are directed to an abstract idea.**

8 “Patent eligibility under 35 U.S.C. § 101” is “an issue of law.” *Mobile Acuity*,
9 110 F.4th at 1289. Section 101 permits patents on “any new and useful process,
10 machine, manufacture, or composition of matter, or any new and useful improvement
11 thereof.” 35 U.S.C. § 101. But there are well-established categorical exclusions to
12 patent eligibility that the Patent Act does not protect, however novel or innovative
13 they might be: laws of nature, natural phenomena, and abstract ideas. *Alice Corp.*
14 *Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014). The rationale is that allowing
15 such patents would stymie, not promote, innovation—nearly all inventions rely on
16 laws of nature, natural phenomena, and abstract ideas in some way. *Id.*

17 The Supreme Court’s decision in *Alice* prescribed a two-step analysis to
18 distinguish between eligible applications and ineligible concepts. 573 U.S. at 217–
19 18. Step one of *Alice* considers whether the claims are directed to an abstract idea by
20 examining “the ‘focus’ of the claims” and their “character as a whole.” *Elec. Power*
21 *Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016). Result-oriented or
22 functional claim language lacking a description of how to accomplish the desired
23 result is abstract. *Id.* at 1356. So are claims that merely use computers as a tool to
24 implement an abstract idea. *Id.* at 1354.

25 If the claims are directed to an abstract idea, step two of *Alice* considers
26 whether they recite an “inventive concept” that is “significantly more” than that
27 abstract idea. *Alice*, 573 U.S. at 217–18. The abstract idea itself cannot supply the
28 inventive concept. *Simio, LLC v. FlexSim Software Prods., Inc.*, 983 F.3d 1353, 1364

(Fed. Cir. 2020); *BSG Tech LLC v. Buyseasons, Inc.*, 899 F.3d 1281, 1290 (Fed. Cir. 2018). That “more” must be a specific limitation or combination. “Insignificant extra-solution activity,” such as implementing the abstract idea on a generic computer, restricting the abstract idea to a particular field of use, or presenting the results of an abstract analysis, is insufficient. *Data Engine Techs. LLC v. Google LLC*, 906 F.3d 999, 1010–12 (Fed. Cir. 2018); *see also Alice*, 573 U.S. at 222. Rather, “significantly more” requires that the additional limitations “transform the nature of the claim into a patent-eligible application” of the underlying abstract idea. *Alice*, 573 U.S. at 217 (citation omitted).

IV. ARGUMENT

A. The claims are directed to the abstract idea of responsive navigation and monitoring (*Alice* step one)

The *Alice* Step One analysis demonstrates that the Zodiac Patents are directed to the abstract idea of observing a physical environment and reacting to it—a fundamental human practice that predates the digital age. Rather than providing a specific technological improvement to digital cameras or pool-cleaning hardware, the claims focus on a functional “black box” loop of data collection and response.

1. The Claims are Directed to the Fundamental Human Task of Observation and Reaction.

Under Step One, the Court must look at the “focus of the claims” and “consider the claims in their entirety to ascertain whether their character as a whole is directed to excluded subject matter.” *ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759, 766 (Fed. Cir. 2019) (citations omitted). Here, the focus is the automation of a longstanding human activity: looking at a pool and deciding what to do next.

A pool owner or lifeguard has performed these claimed steps for decades: they observe the pool surface (capturing an image), identify debris or a person (detecting a characteristic), and move a vacuum or adjust a valve (generating a control response). The Federal Circuit has consistently held that such “observation, evaluation, judgment, [and] opinion” are “mental tasks humans routinely do.” *In re Killian*, 45

1 F.4th 1373, 1379–80 (Fed. Cir. 2022). This Court has applied similar reasoning to
2 image-based tasks, noting that while “tedious,” the process of “looking over a series
3 of images [and] detecting a specific subject” to obtain a result “could theoretically be
4 done by hand.” *Clear Imaging II*, 2025 WL 3496694 at *5 (Curiel, J.).

5 The Zodiac Patents’ express concessions confirm this human analog. The
6 specification admits that “[i]dentification of the person [detected by the cameras]
7 may be achieved by an *off-site human*.” ’207 Patent, 3:66–67 (emphasis added).
8 Further, the patent acknowledges that “automated robotic pool cleaners have been
9 developed” to replace manual cleaning, and the cleaner’s navigation is described as
10 replacing the “tedious and time-consuming task” of “[m]anually cleaning” the pool.
11 *Id.*, 1:26–28. Additionally, the patent frames the purported invention not as a new
12 machine, but instead as a way of “controlling and monitoring” *preexisting*
13 “automated robotic pool cleaners.” *Id.*, 1:26–30. These confirm the claims are
14 directed to “the sort of process that ‘can be performed in the human mind, or by a
15 human using a pen and paper.’” *Ericsson Inc. v. TCL Commc’n Tech. Holdings Ltd.*,
16 955 F.3d 1317, 1327 (Fed. Cir. 2020) (citation omitted).

17 **2. The asserted claims mirror claims consistently found patent-**
18 **ineligible.**

19 The Zodiac Patents fall into a “familiar class of claims” that courts have
20 repeatedly held ineligible because they abstractly cover results rather than a specific
21 process for achieving them. *Elec. Power Grp.*, 830 F.3d 1353; *see also Clear Imaging*
22 *I*, 790 F. Supp. 3d at 957 (Curiel, J.) (“Instead of describing a specific method for
23 arriving at the end result, the claims merely describe using [technology] with
24 conventional components to [perform a function] and arrive at a final [result] . . .
25 [s]uch results-oriented claims are insufficient under *Alice* step one.”). The focus of
26 the Zodiac Patents—automating a manual monitoring and reacting loop using generic
27 hardware—is virtually identical to claims previously invalidated by the Federal
28 Circuit and this Court.

1 The Zodiac Patents are analogous to the claims found ineligible in *Vehicle*
2 *Intelligence & Safety LLC v. Mercedes-Benz USA LLC*, 635 F. App'x 914 (Fed. Cir.
3 2015) (per curiam). In that case, the Federal Circuit invalidated claims for a method
4 that screened equipment operators for impairment and controlled the equipment if an
5 impairment was detected. The representative claim recited a functional loop of
6 screening, testing, and controlling that is substantially similar to the loop claimed by
7 Zodiac.

8 Claim 8 of the '392 patent in *Vehicle Intelligence* recited:

9 A method to screen an equipment operator for impairment, comprising:

10 **screening an equipment operator** by one or more expert systems
11 to detect potential impairment . . . ;

12 **selectively testing** said equipment operator . . . ; and

13 **controlling operation of said equipment** if said selective testing of
14 said equipment operator indicates said impairment

15 *Id.* at 916 (emphasis added). The Federal Circuit held that these claims were drawn
16 to a patent-ineligible abstract idea because they identified a goal—testing for
17 impairment—but failed to “explain *how* to perform either screening or testing . . . [or]
18 specify *how* to program the ‘expert system’ to perform any screening.” *Id.* at 917
19 (emphasis added). The court noted that “critically absent from the entire patent is
20 how the existing vehicle equipment can be used to measure these characteristics” or
21 “how the decision module determines” the response. *Id.* at 918.

22 Here, the Zodiac Patents suffer from this exact same lack of specificity
23 regarding the “how-to” of the invention. Whether viewed as a monitoring method or
24 a cleaner system, the claims are merely a “receive data → analyze data → react” loop
25 that mirrors the *Vehicle Intelligence* claims.

26 **The Monitoring Claim ('207 Patent, Cl. 12):** Like the “screening” and
27 “testing” in *Vehicle Intelligence*, Zodiac’s claim recites “receiving images,”
28 “detecting a characteristic,” and “generating a control response.” *Compare Vehicle*
Intelligence at 916 (Claim 8) with '207 patent, 11:42–12:4 (Claim 12). Just as the

1 *Vehicle Intelligence* court found it insufficient to simply state “use an expert system”
2 to determine impairment, it is insufficient for Zodiac to claim “detecting a
3 characteristic” and “generating a response” without disclosing the specific image-
4 processing rules or control logic required to do so. *See Vehicle Intelligence*, 635
5 F. App’x at 917.

6 **The Cleaner Claim (’207 Patent, Cl. 1):** This claim appends the abstract loop
7 to a physical pool robot. Like the “control module” in *Vehicle Intelligence* that
8 controlled the operation of a vehicle, Zodiac’s Claim 1 recites a controller generating
9 a signal to “cause movement . . . to, or away from” an object. ’207 Patent, 11:4–9.
10 Like the claims in *Vehicle Intelligence*, it fails to disclose the logic required to cause
11 that movement. *Vehicle Intelligence* at 917. As this Court held when invalidating
12 similar claims in *Clear Imaging I*, such claims “say little by way of specifically how
13 the claim arrives at” the result. 790 F. Supp. 3d at 957. Indeed, “[i]nstead of
14 describing a specific method for arriving at the end result, the claims merely describe
15 using a [device] with conventional components to . . . arrive at a final [result]. **Such**
16 **results-oriented claims are insufficient under Alice step one.**” *Id.* (emphasis added).

17 Thus, like the claims in *Vehicle Intelligence*, the Zodiac Patents are ineligible
18 because they claim the abstract idea of automated control without disclosing the
19 specific algorithms or “expert system” logic necessary to achieve it.

20 Additionally, the Zodiac Patents resemble the invalidated data-processing
21 claims found in *Elec. Power Grp.*, 830 F.3d 1350. In that case, the Federal Circuit
22 considered claims directed to “a real-time performance monitoring of an electric
23 power grid.” The representative claim recited:

24 A method of detecting events on an interconnected electric power grid
25 in real time . . . comprising:

26 **receiving** a plurality of data streams . . . ;
27 **receiving** data from other power system data sources . . . ;
28 **receiving** data from a plurality of non-grid data sources;
detecting and analyzing events in real-time . . . ;

1 **displaying** the event analysis results and diagnoses of events and
2 associated ones of the metrics . . . ;
3 **displaying concurrent visualization** of measurements . . . ;
4 accumulating and updating the measurements . . . ; and
5 **deriving a composite indicator** of reliability

6 *Id.* at 1351–52 (emphasis added).

7 The Federal Circuit held that this claim, which involves a three-step
8 progression of collecting, analyzing, and displaying data, was directed to an abstract
9 idea because “information as such is an intangible” and the claims focused on the
10 *combination* of abstract processes (“collecting information, analyzing it, and
11 displaying certain results”) rather than “any particular assertedly inventive
12 technology for performing those functions.” *Id.* at 1353–54.

13 Here, Zodiac’s Monitoring Claim (claim 12 of the ’207 patent) is the
14 conceptual twin of the *Elec. Power Grp.* claims, although more abstract. It relies on
15 the exact same “Receive → Analyze → React” flow:

- 16 • “Receiving”: Just as *Elec. Power Grp.* recited “receiving a plurality of data
17 streams,” Zodiac’s claim recites “receiving images” from cameras.
- 18 • “Detecting”: Just as *Elec. Power Grp.* recited “detecting and analyzing events...
19 based on limits,” Zodiac’s claim recites “detecting a characteristic” based on
20 the images.
- 21 • “Reacting”: Just as *Elec. Power Grp.* recited “displaying the event analysis
22 results,” Zodiac’s claim recites “generating a control response.”

23 Zodiac’s Cleaner Claim (’207 Patent, Cl. 1) fares no better; it relies on
24 substantially the same logic of “receiving data → analyzing data → reacting,”
25 differing only in that the result is physical movement. In *Elec. Power Grp.*, the court
26 held that “merely presenting the results” of the abstract analysis did not render the
27 claim eligible. *Id.* at 1354. Similarly, merely using the results of an abstract analysis
28 to steer a standard pool cleaner does not convert the abstract idea into a patent-eligible
invention. Indeed, there is no meaningful distinction between monitoring the status

1 of a “power grid” and monitoring the “cleanliness characteristic” of a pool. Both
2 claims “consist[] solely of result-oriented, functional language and omit[] any
3 specific requirements as to how these steps of information manipulation are
4 performed.” *Clear Imaging I*, 790 F. Supp. 3d at 957 (citation omitted). Because the
5 Zodiac Patents fail to define a “specific, non-preemptive way” of performing this
6 monitoring—relying instead on generic controllers to simply *do* it—they are directed
7 to an abstract idea.

8 Further, the Federal Circuit has confirmed that the specific logic recited in
9 Zodiac’s claims—observing a condition and acting on the condition—is an ineligible
10 mental process. In *In re Rudy*, the court considered claims for a method of choosing
11 a fishing hook based on “water conditions” observed by the user. 956 F.3d 1379,
12 1381 (Fed. Cir. 2020). The representative claim recited three steps: (1) “**observing**
13 clarity of water”; (2) “**measuring** light transmittance”; and (3) “**selecting** a colored
14 or colorless quality of the fishing hook” based on those observed conditions. *Id.* at
15 1381 (emphasis added).

16 The Federal Circuit held that these steps were directed to an abstract idea
17 because “observing” a condition and “selecting” an action based on that observation
18 are “mental processes akin to data collection or analysis.” *Id.* at 1385. The court
19 emphasized that “**collecting information...** and **analyzing that information** are
20 within the realm of patent-ineligible abstract ideas.” *Id.* at 1384 (emphasis added).

21 The Zodiac Patents attempt to claim the robotic equivalent of the *Rudy* mental
22 process, and both claim types fail for the same reasons identified in that case:

23 **The Monitoring Claim (’207 Patent, Cl. 12):** This claim is the direct analog
24 of the “observing” and “selecting” method in *Rudy*. It recites a controller that collects
25 information (“receiving images”), analyzes it (“detecting a characteristic”), and
26 **selects an action** (“generating a control response”). Just as *Rudy* held that “collecting
27 information . . . and analyzing that information” are abstract mental processes,
28 Zodiac’s claim to detecting a condition and generating a response is abstract. As this

1 Court noted in *Clear Imaging II*, while such tasks might be “tedious,” the process of
2 “looking over a series of images [and] detecting a specific subject” is a task that
3 “could theoretically be done by hand.” 2025 WL 3496694, at *5.

4 **The Cleaner Claim ('207 Patent, Cl. 1):** This claim appends the abstract
5 selection process to a physical pool robot. But the *Rudy* court rejected the argument
6 that physical components could save the claims, holding that “physical details of the
7 fishing hook and lure” do “not change the fact that the character of the claim, as a
8 whole, is directed to an abstract idea.” 956 F.3d at 1386. The same logic applies here:
9 the “vehicle body,” “filter,” “means for moving,” “camera,” and “controller” in
10 Zodiac’s claims are merely the physical environment for the abstract navigation
11 process, just as the “hook” and “lure” were for the selection process. Because the
12 Zodiac Patents do not claim a specific *technological method* for performing this
13 detection—but instead claim the *result* of detection—they fail to provide a solution
14 and instead “monopolize the [abstract idea] itself.” *Alice*, 573 U.S. at 223–24.

15 Finally, the Zodiac Patents suffer from the same “results-oriented” defect as
16 the camera patents this Court invalidated in *Clear Imaging I*. 790 F. Supp. 3d 948. In
17 that case, this Court considered claims directed to combining images to create a “blur
18 free image.” Representative Claim 20 of the '740 Patent in *Clear Imaging I* recited:

19 An imaging device comprising:
20 a user interface configured to **display an image** . . . ;
21 a processor configured to **receive user input** . . . ;
22 a memory configured to store [the images] . . . ;
a processor configured to combine [the images]

23 *Id.* at 956. This Court held those claims ineligible because they failed to
24 disclose the specific technological process for achieving the result. As this Court
25 explained, “[i]nstead of describing a specific method for arriving at the end result,
26 the claims merely describe using a digital camera with conventional components to
27 combine images and arrive at a final, blur free image or video. Such results-oriented
28 claims are insufficient under *Alice* step one.” *Id.* at 957.

1 Here, the Zodiac Patents suffer from this exact same defect. They recite a
2 “receiving data → analyzing data → reacting” loop without disclosing the “specific
3 method for arriving at the end result.” *Id.*

4 Specifically, Zodiac’s Monitoring Claim recites “detecting a characteristic”
5 and “generating a control response.” ’207 Patent, 11:42–12:4. But just as those
6 invalid claims in *Clear Imaging I* said “little by way of specifically how the claim
7 arrives at the blur free image,” Zodiac’s claim fails to explain *how* the processor
8 detects the characteristic or generates the response. 790 F. Supp. 3d at 957. “Without
9 more than this results-oriented language, the claim does not recite more than the
10 abstract idea itself.” *Id.* Additionally, Zodiac’s Cleaner Claim appends the
11 aforementioned abstract loop to a physical pool robot. But this Court held that
12 reciting “conventional [hardware] components” like “image sensor” and “processor”
13 cannot save the claims in *Clear Imaging I*. 790 F. Supp. 3d at 956. Rather, those
14 physical components simply provided a “generic environment in which to carry out
15 the abstract idea.” *Id.* (citing *Yu v. Apple Inc.*, 1 F.4th 1040, 1043 (Fed. Cir. 2021)).
16 Zodiac’s recitation of a “vehicle body,” “filter,” “means for moving,” “camera,” and
17 “controller” merely provides a generic environment for the abstract idea of
18 responsive navigation. By failing to describe *how* the robot moves “to, or away from”
19 the object, the claim remains “results-oriented” and directed to an abstract idea.

20 **3. Zodiac’s Claims are not an “improvement in computer-
21 related technology.”**

22 Zodiac cannot save the Asserted Claims by arguing they are an improvement
23 in computer-related technology. Under cases like *Enfish, LLC v. Microsoft Corp.*,
24 822 F.3d 1327 (Fed. Cir. 2016), some improvements to computer-related technology
25 are not abstract and, therefore, patent-eligible at Step One. But the crucial distinction
26 for claims that fall under the *Enfish* line of cases lies between situations where “the
27 focus of the claims is on the specific asserted improvement in computer capabilities”
28 and those where “computers are invoked merely as a tool” to perform an abstract idea.

1 *Id.* at 1335–36. The former are patent-eligible; the latter are not. *Id.* at 1336. The
2 Zodiac Patents fall squarely into the latter category. They are “directed to a result or
3 effect that itself is the abstract idea and merely invoke generic processes and
4 machinery” rather than any specific technological improvement. *Yu*, 1 F.4th at 1043
5 (citation omitted).

6 *First*, the Zodiac claims barely recite any specific hardware or software at all,
7 and the structures that are referenced—a “controller,” a “camera,” a “vehicle body,”
8 and a “filter”—are all described in generic, functional terms. *See, e.g.*, ’207 Patent,
9 11:42–12:4. In *Hawk Technology Systems, LLC v. Castle Retail, LLC*, 60 F.4th 1349
10 (Fed. Cir. 2023), the Federal Circuit invalidated claims for a video surveillance
11 system because the claims failed to recite a specific solution to a technical problem
12 (bandwidth conservation), lacked “sufficient recitation of how the purported
13 invention improve[s] the functionality” of video surveillance systems, and were
14 “recited at such a level of result-oriented generality that those claims amount[] to a
15 mere implementation of an abstract idea.” *Id.* at 1357–58 (citation omitted); *see also*
16 *Free Stream Media Corp. v. Alphonso Inc.*, 996 F.3d 1355, 1363–64 (Fed. Cir. 2021)
17 (finding claims ineligible at Step One where they failed to “identify ‘how’ that
18 functional result is achieved” and instead were “directed to a result or effect that itself
19 is the abstract idea and merely invoke generic processes and machinery”); *Two-Way*
20 *Media Ltd. v. Comcast Cable Commc’ns, LLC*, 874 F.3d 1329, 1337 (Fed. Cir. 2017)
21 (holding claims ineligible where they used “result-based functional language” like
22 “converting,” “routing,” and “controlling” without describing how to achieve the
23 results).

24 Zodiac’s claims suffer from the exact same defect. The Monitoring recites a
25 “controller” performing the functions of “receiving,” “detecting,” and “generating.”
26 It does not explain *how* the controller is structured or *how* it is improved to perform
27 these tasks better than a standard computer. Neither does the Cleaner Claim.
28

1 As this Court held in *Clear Imaging I*, such claims do not recite an
2 improvement in functionality. 790 F. Supp. 3d at 958. In that case, this Court rejected
3 the argument that the claims improved camera technology, noting that “[i]nstead of
4 describing a specific method for arriving at the end result, the claims merely describe
5 using a digital camera with conventional components . . . to arrive at a final [result].”
6 *Id.* at 957. The Court emphasized that “[t]he exemplary claims are not specific
7 improvements in computer functionality . . . [i]nstead, they take an abstract idea and
8 carry it out using conventional camera components.” *Id.* at 958. Zodiac’s claims are
9 exactly the same: they take the abstract idea of “monitoring and reacting” and carry
10 it out using conventional pool-cleaner components.

11 *Second*, the patent specification confirms that the claimed hardware is generic
12 and incidental to the abstract idea. In *In re TLI Communications LLC Patent*
13 *Litigation*, 823 F.3d 607 (Fed. Cir. 2016), the court found claims ineligible where the
14 specification described the physical components (a “telephone unit” and “server”) in
15 “vague, functional descriptions” and admitted they performed “known” functions. *Id.*
16 at 613–15. The Zodiac Patents do not describe a new type of camera, a new processor
17 architecture, or a new propulsion system. Instead, they describe standard components
18 performing their expected functions: a camera captures images, and a controller
19 processes data. *See, e.g.*, ’207 Patent, 4:5–9 (describing that the system can utilize
20 “*pre-existing cameras* provided as part of a security system”) (emphasis added).

21 Just as in *Hawk Technology*, where the specification confirmed the use of
22 “existing broadband infrastructures” and a “generic PC-based server,” 60 F.4th at
23 1353, Zodiac’s specification confirms that the invention can be implemented using
24 standard processors. This demonstrates that the focus of the claims is not on an
25 *improvement* to the computer or robot itself, but on the *abstract process* it performs.

26 *Finally*, Zodiac cannot rely on the mere combination of these generic
27 components to establish an improvement. As the Federal Circuit held in *Yu*, even a
28 “vital” hardware configuration does not save a claim if the hardware “merely serve[s]

1 as ‘a conduit for the abstract idea.’” *Yu*, 1 F.4th at 1045 (quoting *TLI*, 823 F.3d at
2 612). Because the Zodiac Patents recite nothing more than generic components
3 performing their basic functions to achieve an abstract result, they are not directed to
4 an improvement in computer-related technology.

5 **B. The asserted claims lack an inventive concept that is “significantly**
6 **more” than the abstract idea (*Alice* Step Two).**

7 The Zodiac Patents cannot be rescued at *Alice* Step Two. This step is a search
8 for an “inventive concept”—i.e., an element or combination of elements that is
9 “sufficient to ensure that the patent in practice amounts to significantly more than a
10 patent upon the ineligible concept itself.” *Alice*, 573 U.S. at 217–18. However, “[i]f
11 a claim’s only ‘inventive concept’ is the application of an abstract idea using
12 conventional and well-understood techniques, the claim has not been transformed
13 into a patent-eligible application of an abstract idea.” *BSG Tech LLC.*, 899 F.3d at
14 1290–91.

15 Here, the Zodiac Patents lack any such concept. They simply apply the abstract
16 idea of “monitoring and reacting” using routine, conventional components arranged
17 in ordinary and predictable ways.

18 **1. The claims recite only well-known, routine, and**
19 **conventional components.**

20 For starters, the Zodiac Patents comprise nothing more than well-known,
21 routine, conventional components performing their basic functions. In *Clear Imaging*
22 *I*, this Court found that the exemplary claims merely recited “concrete, tangible
23 components to implement the abstract idea with well-understood, conventional
24 activities.” *Id.* at 959. Relying on the Federal Circuit’s reasoning in *Yu*, 1 F.4th 1040,
25 this Court held that components such as a “lens,” “image sensor,” “processor,” and
26 “memory” were “well-known” and “conventional camera components” that did not
27 save the claims. *Clear Imaging I*, at 960.

1 For example, the components recited in the Cleaner Claim ('207 Patent, Cl. 1)
2 are indistinguishable from those “well-known” and “conventional” components in
3 the claims rejected in *Clear Imaging I*:

4 A “**vehicle body**” and “**means for moving**”: The specification admits that
5 “automated robotic pool cleaners *have been developed*” and are well-known in the
6 art. '207 Patent, 1:26–27. The specification also confirms these are standard and
7 conventional components of pool cleaners, describing the propulsion simply as using
8 conventional “wheels, rollers, tracks” or a “vacuum or liquid jet” or “other propulsion
9 mechanisms.” *Id.*, 3:36–45, 10:9–30. Thus, the physical robot is not an inventive
10 concept but merely the pre-existing “automated robotic pool cleaners” that are being
11 “controll[ed] and monitor[ed].” *Id.*, 1:27–30.

12 A “**filter**” (Claim 1): This is a purely functional recitation of a conventional
13 component described only as being “configured to retain debris,” without any
14 inventive structural details. *Id.*, 3:11–16.

15 A “**camera**” (Claims 1, 12): The specification admits that the system does not
16 require custom hardware, but instead may utilize “pre-existing cameras 32 provided
17 as part of a security system” or standard “dedicated cameras.” *Id.*, 4:5–9.

18 A “**controller**” (Claims 1, 12): The specification explicitly defines the
19 controller as a generic black box. It admits that the controller is merely “one or more
20 processing units,” defined broadly as “a *presently developed or future developed*
21 processing unit that executes sequences of instructions.” *Id.*, 4:18–36. It utilizes
22 standard “random access memory (RAM)” and “read only memory (ROM).” *Id.*
23 Crucially, the patent explicitly disclaims any specific structure, stating: “Unless
24 otherwise specifically noted, *the controller is not limited to any specific combination*
25 *of hardware circuitry and software.*” *Id.* (emphasis added).

26 Because the limitations at issue here do nothing beyond recite conventional
27 hardware components (as explained above) performing basic functions at a high level
28 of generality, *Alice* Step Two cannot save the claims. *See, e.g., Vehicle Intelligence,*

635 F. App'x at 919–20 (finding no inventive concept where claims merely stated the use of an “expert system” and “existing equipment modules” like gas/brake pedals, noting the patent was “completely devoid of any explanation of what these hardware and software differences are” compared to a generic computer); *In re Rudy*, 956 F.3d at 1386 (holding that “physical details” of a fishing hook and lure did not provide an inventive concept because “routine, conventional activities previously known to the industry” cannot transform an abstract idea); *Elec. Power Grp.*, 830 F.3d at 1355 (finding no inventive concept where “[n]othing in the claims . . . requires anything other than off-the-shelf, conventional computer, network, and display technology for gathering, sending, and presenting the desired information”).

2. The “ordered combination” adds nothing inventive.

Under Step Two, the claimed components must be considered not just individually, but also as an “ordered combination.” *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1349–50 (Fed. Cir. 2016). However, an ordered combination is not inventive where it merely uses a “conventional ordering of steps . . . with conventional technology to achieve its desired result.” *Two-Way Media*, 874 F.3d at 1339.

Here, the Zodiac Patents fail this inquiry for the same reason their individual components do: combining generic sensors with a generic motor using a generic controller does not create an inventive concept.

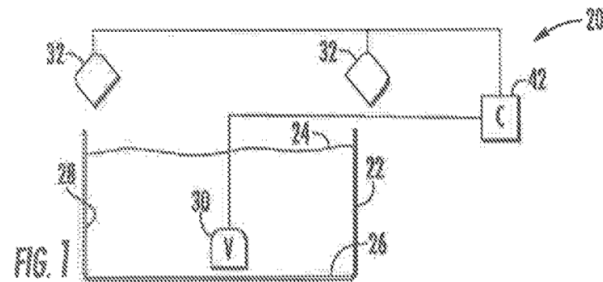
First, the claims here merely recite standard components connected in the most obvious way possible to perform the abstract function, and the arrangement of these standard components is entirely generic.

For example, the Cleaner Claim ('207 Patent, Cl. 1) recites:

- d. **at least one camera** for capturing an image . . . ; and
- e. a **controller** (i) in electronic communication with the at least one camera and (ii) configured to generate . . . at least one control signal to cause movement of **the body**.

1 '207 Patent, 10:58–66 (emphasis added).

2 Figure 1 of the '207 Patent (left),
3 purporting to show an implementation
4 of this system, confirms that this
5 “ordered combination” is nothing more
6 than a standard functional block.



7 This figure is nothing more than a block diagram at the highest level of
8 abstraction. It shows a “controller” (box 42) connected via standard lines to a “vehicle”
9 (box 30) and “cameras” (boxes 32). A review of the patent’s description reveals there
10 is nothing inventive or unique about this arrangement. Specifically, the controller (42)
11 is described simply as “one or more processing units” in communication with the
12 vehicle and cameras. ’207 Patent, 4:18–36. The connection is described as a standard
13 “wired connection” or “wireless connection” (such as a LAN or WAN) or a
14 combination thereof. *Id.*, 4:37–45. Further, the operation is described functionally:
15 “Controller 42 is configured to generate control signals for steering vehicle 30 based
16 upon signals received from cameras 32.” *Id.*, 4:46–48.

17 This is the most conventional, logical, and indeed *only* way to arrange these
18 components to perform the abstract idea: the controller *must* be connected to the
19 sensors (cameras) to receive data and *must* be connected to the motor (vehicle) to
20 send commands. Thus, the “system” is nothing more than generic computer
21 components, connected generically, implementing an abstract idea. As the Federal
22 Circuit held in *Bascom*, “[a]n inventive concept . . . cannot simply be an instruction
23 to implement or apply the abstract idea on a computer.” 827 F.3d at 1349; *see also*
24 *Elec. Power Grp.*, 830 F.3d at 1355 (finding no inventive concept where claims did
25 not require “any nonconventional computer, network, or display components”);
26 *Ficep Corp. v. Peddinghaus Corp.*, No. 2022-1590, 2023 WL 5346043, at *6–7 (Fed.
27 Cir. Aug. 21, 2023) (holding that adding a “generic manufacturing machine” to
28 perform “post-solution activity” did not provide an inventive concept because an

1 abstract idea cannot supply the inventive concept); *Univ. of Florida Rsch. Found.*,
2 916 F.3d at 1368–69 (rejecting *Bascom*-based argument where the patent merely
3 proposed using “a general-purpose computer” to carry out the abstract idea of
4 collecting and analyzing data, holding that such claims do no “more than simply
5 instruct the practitioner to implement the abstract idea . . . on a generic computer”);
6 *Rensselaer Polytechnic Inst. v. Amazon.com, Inc.*, 723 F. Supp. 3d 132, 144
7 (N.D.N.Y. 2024) (holding that claim elements “ordered in a predictable manner for
8 collecting, analyzing, and displaying information” failed to provide an inventive
9 concept because they “simply ‘spell[] out what was inherent in the abstract idea
10 itself’”), *appeal docketed*, No. 24-1739 (Fed. Cir. Apr. 25, 2024).

11 Indeed, the ’207 patent explicitly admits that the hardware platform itself was
12 already well-known. The Background section acknowledges that “automated robotic
13 pool cleaners have been developed” to replace manual cleaning. ’207 Patent, 1:26–
14 27. It frames the purported invention not as a new machine, but merely as a way of
15 “controlling and monitoring *such* automated robotic pool cleaners.” *Id.*, 27–30
16 (emphasis added). As the Federal Circuit held in *Ficep Corp.*, adding a “generic . . .
17 machine” to perform abstract steps does not provide an inventive concept. 2023 WL
18 5346043, at *6. Similarly, just as in *Univ. of Florida Research Foundation*, these
19 claims do no “more than simply instruct the practitioner to implement the abstract
20 idea . . . on a generic” machine—here, the pre-existing pool cleaner. 916F.3d at 1369
21 (quoting *Alice*, 573 U.S. at 225). Adding a generic camera and controller to this
22 existing robot merely “‘spell[s] out what was inherent in the abstract idea itself’” and
23 does not transform it into patent-eligible subject matter. *Rensselaer*, 723 F. Supp. 3d
24 at 145.

1 **C. Claims 1 and 12 of the '207 patent are representative of all**
2 **asserted claims.**

3 For the purposes of this § 101 challenge, the Court should treat Independent
4 Claims 1 and 12 of the '207 patent as representative of all asserted claims in
5 the '207, '766, and '191 patents.

6 “Limiting the analysis of a § 101 challenge to representative claims is proper
7 when the claims at issue are substantially similar and linked to the same ineligible
8 concept.” *Clear Imaging II*, 2025 WL 3496694, at *11 (quoting *Mobile Acuity*, 110
9 F.4th at 1290). This occurs when “any differences among the claims are not material
10 to the eligibility analysis.” *Id.* (quoting *Mobile Acuity*, 110 F.4th at 1291).

11 The patent challenger “bears the initial burden to make a prima facie showing
12 that the group of claims are substantially similar and linked to the same ineligible
13 concept.” *Id.* (citation omitted). Once met, the burden shifts to the patentee to
14 “articulate[] why a claim limitation not found in the representative claim has
15 ‘distinctive significance’ that would have a material impact on the eligibility analysis.”
16 *Id.* (quoting *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1365 (Fed. Cir. 2018)). It is
17 proper to consider one claim to be representative of multiple patents that share a
18 specification and similar claims. *See Broadband iTV, Inc. v. Amazon.com, Inc.*, 113
19 F.4th 1359, 1371 (Fed. Cir. 2024) (treating one claim as representative of four
20 patents having “a common specification”). Here, the claims themselves confirm that
21 the exemplary claims are representative.

22 **1. The independent claims are substantively identical.**

23 As shown in the Factual Background (*supra* §§II.B-II.C), the independent
24 claims of the '766 and '191 patents are substantially similar to Claim 1 of the '207
25 patent. Each recites the same abstract loop: (1) a camera captures images; (2) a
26 controller analyzes them; and (3) a vehicle moves in response.

27 While some independent claims in the '766 patent add minor hardware
28 variations—such as a “portable electronic device” (claim 3) or a “chemical dispenser”

(claim 5)—these differences do not alter the eligibility analysis. First, adding a “portable electronic device” for communication (Claim 3) merely recites a generic computer component performing its standard function of receiving or sending data. *See Clear Imaging II*, 2025 WL 3496694, at *10 (finding claims ineligible where they merely recited “generic features” like a communication device). Second, adding a “chemical dispenser” (Claim 5) merely adds a conventional pool maintenance tool to the vehicle, similar to the “filter” already recited in Representative Claim 1. This is a standard mechanical addition that does not modify the abstract control logic at the heart of the claim. These minor variations are “not substantial enough to divorce them from the underlying abstract concept.” *Clear Imaging II*, 2025 WL 3496694, at *12. Accordingly, Claim 1 of the ’207 Patent remains representative of the fundamental system asserted in all three patents.

These minor variations are “not substantial enough to divorce them from the underlying abstract concept.” *Clear Imaging II*, 2025 WL 3496694, at *12. Thus, Claim 1 of the ’207 patent is representative of the system claimed in all three patents.

2. The dependent claims add only generic limitations.

Dependent claims 3, 5–8, 13, 14, and 19 of the ’207 Patent add nothing that affects the § 101 analysis. They generally fall into two categories of non-inventive limitations: generic hardware placement, and result-oriented data constraints.

First, several claims merely specify standard components or their physical location. Claim 3 limits the “pool system” to a “cleaning device with one or more propulsion mechanisms,” which merely aligns the broader system claim with the representative Cleaner Claim (Claim 1) that already recites a vehicle with “means for moving.” Similarly, Claims 5 and 6 specify that the camera is “mounted on the... equipment” or is “submersible.” These are routine design choices for placement of generic sensors in a pool environment. Claim 14 specifies that the control response involves “controlling an operation of a piece of equipment.” This is nothing more than generic post-solution activity—using the abstract result to perform a task. *See*

1 *Ficep Corp.*, 2023 WL 5346043, at *6 (holding that “generic manufacturing
2 machine . . . based on received data . . . is merely post-solution activity”).

3 *Second*, other claims restrict the *type* of data analyzed or the *parameter*
4 controlled without explaining *how* to achieve the result. Claims 7, 8, and 13 specify
5 that the detected characteristic is “cleanliness” or involves a “threshold.” Limiting
6 the abstract idea of monitoring to a specific type of data (cleanliness) does not render
7 the claim non-abstract. *See Elec. Power Grp.*, 830 F.3d at 1355 (holding that
8 “selecting information, by content or source” for analysis is abstract). Likewise,
9 Claim 19 lists potential control responses, such as controlling a “path or route,”
10 “aggressiveness,” or “speed.” These are standard variable parameters for any motor
11 controller. The claim does not recite *how* the controller calculates the path or
12 determines the appropriate speed; it merely lists the desired results. *See Clear*
13 *Imaging I*, 790 F. Supp. 3d at 961 (rejecting claims that failed to recite the specific
14 technological implementation required to achieve the result).

15 Accordingly, the differences among the claims are not material to eligibility,
16 and Claims 1 and 12 of the ’207 patent are representative of all asserted claims.

17 **D. The Court should dismiss the counterclaims with prejudice.**

18 The Court should dismiss Zodiac’s infringement counterclaims with prejudice.
19 In the § 101 context, district courts routinely dismiss patent-ineligible claims without
20 leave to amend because amendment would be futile. *See Sanderling Mgmt. Ltd. v.*
21 *Snap Inc.*, 65 F.4th 698, 706 (Fed. Cir. 2023) (holding district court did not err in
22 dismissing patent-ineligible claims with prejudice because “[n]o amendment to a
23 complaint can alter what a patent itself states”).

24 This Court has applied this rule in recent cases involving similar technology.
25 In *Clear Imaging I*, this Court denied leave to amend after finding claims ineligible
26 under *Alice*, holding that “[P]laintiff cannot cure the deficiency in the exemplary
27 claims with factual allegations because the claims, as written, do not support any
28 possible finding that they supply an inventive concept.” 790 F. Supp. 3d at 963. The

1 Court explained that where claims are “too broad and lack any meaningful
2 limitations,” any attempt to amend the pleadings would be futile. *Id.* (citation
3 omitted). In *Clear Imaging II*, this Court again denied leave to amend, rejecting the
4 plaintiff’s offer to plead additional facts about the “state of the art” or “commercial
5 embodiments.” 2025 WL 3496694, at *13. The Court held that such amendments
6 “would not change the fact that the patents’ asserted ‘inventive concept’ is simply an
7 application of the same ineligible concept,” and therefore “would be futile.” *Id.*

8 The same result is warranted here. The defects in the Zodiac Patents are
9 intrinsic to the claims themselves: they recite generic components (camera,
10 controller, motor) performing the abstract idea of monitoring and reacting. No
11 amount of artful pleading can change the text of the claims or the admissions in the
12 specification that the hardware platform was already well-known. *See, e.g.,* ’207
13 Patent, 1:26–30, 3:11–16, 3:36–45, 4:5–9, 4:18–36, 10:9–30. Because “allegation of
14 other facts consistent with the challenged pleading could not possibly cure the
15 deficiency,” dismissal with prejudice is appropriate. *DeSoto v. Yellow Freight Sys.,*
16 *Inc.*, 957 F.2d 655, 658 (9th Cir. 1992); *Clear Imaging I*, 790 F. Supp. 3d at 963.

17 **V. CONCLUSION**

18 For the foregoing reasons, Beatbot respectfully requests that the Court grant
19 this Motion and dismiss with prejudice Zodiac’s Counterclaims I, II, and III.

1 Dated: March 6, 2026

PERKINS COIE LLP

2 By: /s/ Kyle R. Canavera

3 Kyle R. Canavera, Bar No. 314664

4 KCanavera@perkinscoie.com

5 John D. Esterhay, Bar No. 282330

6 JEsterhay@perkinscoie.com

7 Wei Yuan, Bar No. 315388

8 WYuan@perkinscoie.com

9 Attorneys for Plaintiffs *Beatbot*
10 *Technology (USA) Co. Ltd., Deepwater*
11 *Innovation Technology (Hong Kong)*
12 *Limited, And Xingmai Innovation*
13 *Technology (Suzhou) Co., Ltd.*
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1 Kyle R. Canavera, Bar No. 314664
2 KCanavera@perkinscoie.com
3 Wei Yuan, Bar No. 315388
4 WYuan@perkinscoie.com
5 **PERKINS COIE LLP**
6 11452 El Camino Real, Ste 300
7 San Diego, California 92130-2080
8 Telephone: +1.858.720.5700
9 Facsimile: +1.858.720.5799

10 *Attorneys for Plaintiffs*
11 *Beatbot Technology (USA) Co. Ltd.,*
12 *Deepwater Innovation Technology*
13 *(Hong Kong) Limited, Xingmai*
14 *Innovation Technology (Suzhou)*
15 *Co., Ltd.*

16 UNITED STATES DISTRICT COURT
17 SOUTHERN DISTRICT OF CALIFORNIA

18 BEATBOT TECHNOLOGY (USA)
19 CO. LTD., DEEPWATER
20 INNOVATION TECHNOLOGY
21 (HONG KONG) LIMITED, and
22 XINGMAI INNOVATION
23 TECHNOLOGY (SUZHOU) CO.,
24 LTD.,

25 Plaintiffs,

26 v.

27 ZODIAC POOL SYSTEMS LLC,

28 Defendant.

Case No. 3:25-cv-01946-GPC-JLB

**DECLARATION OF WEI YUAN
IN SUPPORT OF BEATBOT'S
MOTION TO DISMISS ZODIAC'S
COUNTERCLAIMS**

Date: May 22, 2026

Time: 1:30 p.m.

Courtroom: 12A, 12th Floor

Judge: Hon. Gonzalo P. Curiel

1 I, Wei Yuan, declare:

2 1. I am a member of the Bar of the State of California and an attorney at
3 the law firm of Perkins Coie LLP, counsel of record for Plaintiffs Beatbot
4 Technology (USA) Co. Ltd., Deepwater Innovation Technology (Hong Kong)
5 Limited, and Xingmai Innovation Technology (Suzhou) Co., Ltd. (collectively,
6 “Beatbot”). I submit this Declaration in support of Beatbot’s Motion to Dismiss. I
7 have personal knowledge of the facts stated in this declaration and, if called as a
8 witness, could and would testify competently to those facts.

9 2. Attached as Exhibit 1 is a true and correct copy of U.S. Patent No.
10 11,880,207.

11 I declare under penalty of perjury under the laws of the United States of
12 America that the foregoing is true and correct. This declaration is executed on
13 March 6, 2026, at Shenzhen, China.

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/s/ Wei Yuan

Wei Yuan

EXHIBIT 1



US011880207B2

(12) **United States Patent**
Durvasula et al.

(10) **Patent No.:** **US 11,880,207 B2**

(45) **Date of Patent:** ***Jan. 23, 2024**

(54) **POOL CLEANING SYSTEM AND METHOD TO AUTOMATICALLY CLEAN SURFACES OF A POOL USING IMAGES FROM A CAMERA**

(58) **Field of Classification Search**

CPC .. G05D 1/0246; G05D 1/0016; G05D 1/0033;
G05D 1/0038; G05D 2201/0203;
(Continued)

(71) Applicant: **ZODIAC POOL SYSTEMS LLC**,
Carlsbad, CA (US)

(56) **References Cited**

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(72) Inventors: **Kameshwar Durvasula**, Garfield, NJ
(US); **William Londono Correa**,
Bloomfield, NJ (US)

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(73) Assignee: **ZODIAC POOL SYSTEMS LLC**,
Carlsbad, CA (US)

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(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

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This patent is subject to a terminal disclaimer.

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Jun. 8, 2016, 2 pages.

(21) Appl. No.: **17/572,388**

(Continued)

(22) Filed: **Jan. 10, 2022**

Primary Examiner — Allen C Wong

(65) **Prior Publication Data**

US 2022/0129005 A1 Apr. 28, 2022

(74) *Attorney, Agent, or Firm* — Kilpatrick Townsend &
Stockton LLP

Related U.S. Application Data

(63) Continuation of application No. 17/143,624, filed on
Jan. 7, 2021, now Pat. No. 11,262,766, which is a
(Continued)

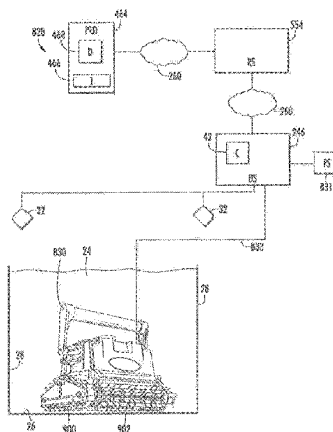
(51) **Int. Cl.**
G05D 1/02 (2020.01)
H04N 7/18 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC **G05D 1/0246** (2013.01); **E04H 4/1654**
(2013.01); **G05D 1/0016** (2013.01);
(Continued)

(57) **ABSTRACT**

A pool cleaning system for cleaning debris from a submerged surface of a swimming pool includes a self-propelled pool cleaner having rotatably-mounted supports for supporting and guiding the cleaner on the pool surface; an electric motor for enabling the rotation of the rotatably-mounted supports on the pool surface; at least one camera to capture imagery of the pool surface; a controller, in electronic communication with the at least one camera, to determine a cleanliness characteristic of the pool surface on which the cleaner has passed based on the camera imagery and generate a control signal to direct movement of the cleaner based on the cleanliness characteristic of the pool surface, and a portable electronic device configured to present a graphic on a display, the graphic depicting the

(Continued)



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submerged surface of the pool and those portions of the surface that remain uncleaned as the cleaner traverses the pool surface.

20 Claims, 4 Drawing Sheets

Related U.S. Application Data

continuation of application No. 16/919,750, filed on Jul. 2, 2020, now Pat. No. 11,003,191, which is a continuation of application No. 16/416,840, filed on May 20, 2019, now Pat. No. 10,739,785, which is a continuation of application No. 15/973,983, filed on May 8, 2018, now Pat. No. 10,338,599, which is a continuation of application No. 15/207,065, filed on Jul. 11, 2016, now Pat. No. 9,995,051, which is a continuation of application No. 13/545,918, filed on Jul. 10, 2012, now Pat. No. 9,388,595.

- (51) **Int. Cl.**
H04N 23/66 (2023.01)
E04H 4/16 (2006.01)
G05D 1/00 (2006.01)
H04N 23/50 (2023.01)
G06T 7/90 (2017.01)
G06T 7/00 (2017.01)
- (52) **U.S. Cl.**
CPC **G05D 1/0033** (2013.01); **G05D 1/0038** (2013.01); **H04N 7/18** (2013.01); **H04N 23/66** (2023.01); **G05D 2201/0203** (2013.01); **G06T 7/001** (2013.01); **G06T 7/90** (2017.01); **G06T 2207/10024** (2013.01); **H04N 23/555** (2023.01)
- (58) **Field of Classification Search**
CPC H04N 23/66; H04N 23/555; H04N 7/18; E04H 4/1654; G06T 7/90; G06T 7/001; G06T 2207/10024
USPC 348/114
See application file for complete search history.

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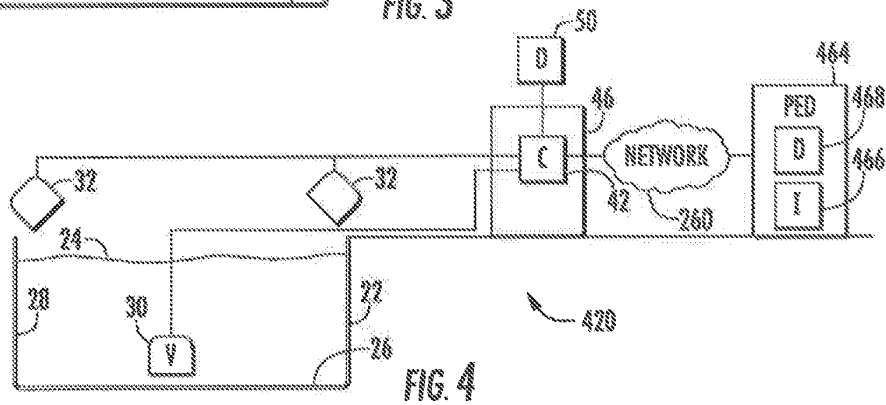
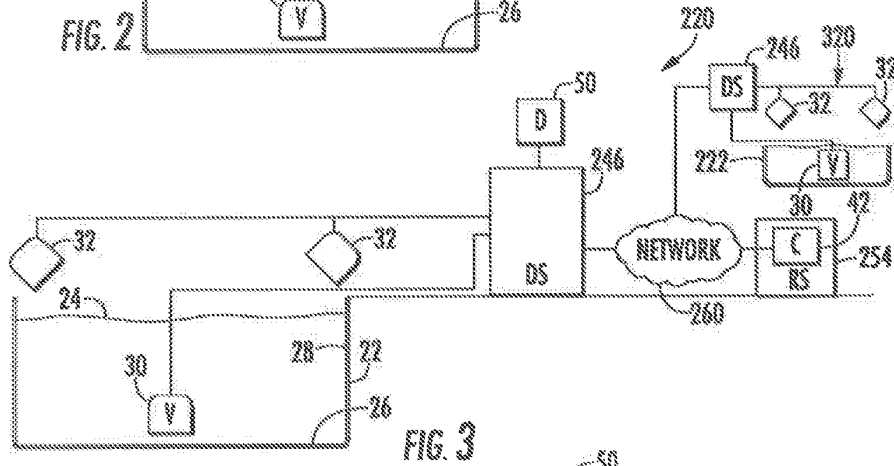
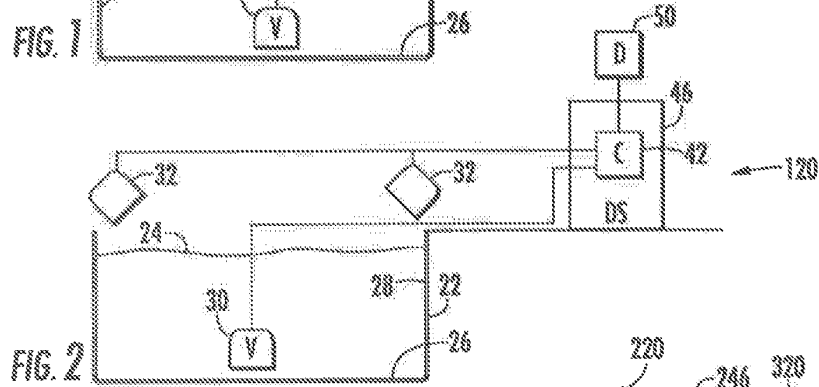
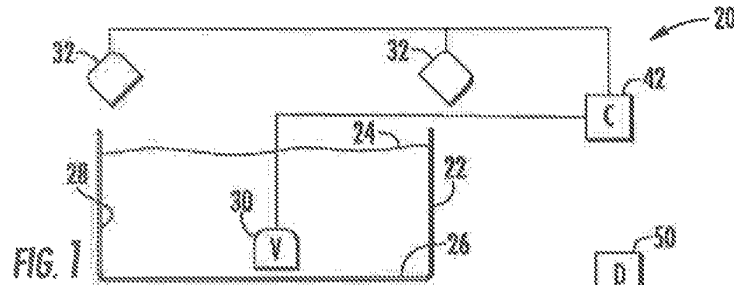
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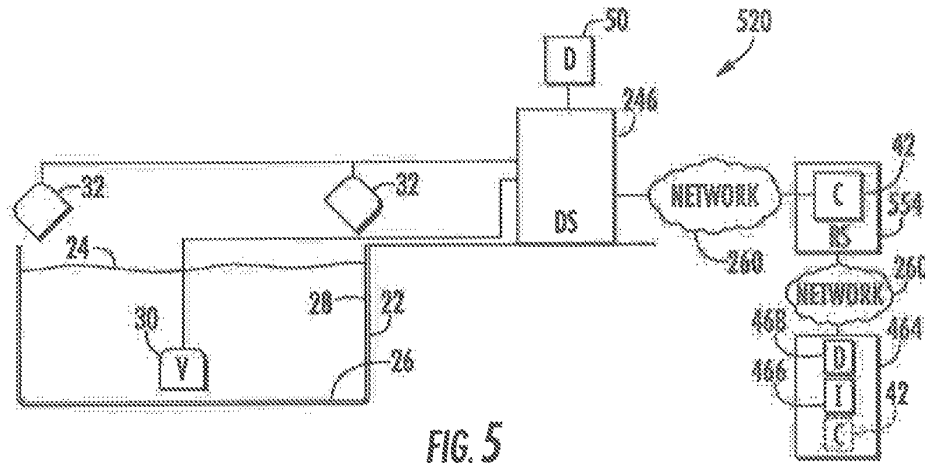


FIG. 5

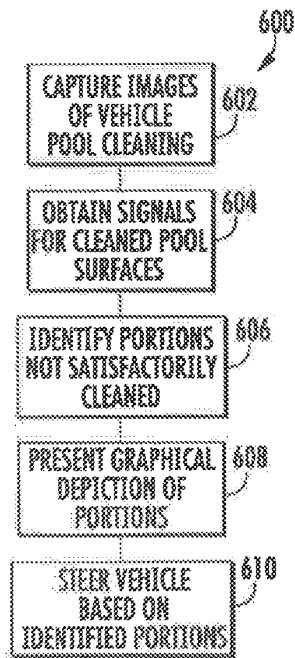


FIG. 6

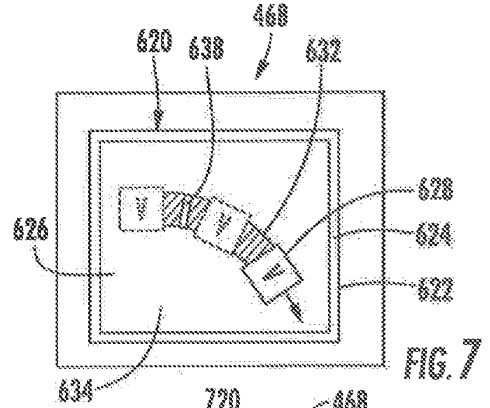


FIG. 7

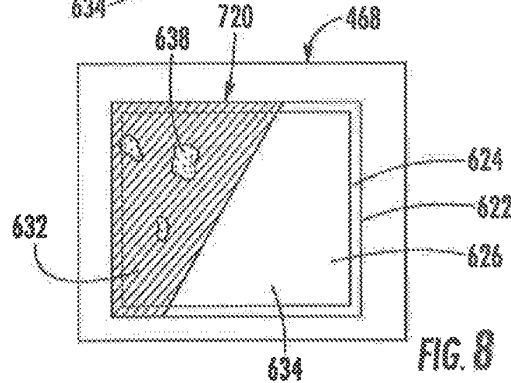


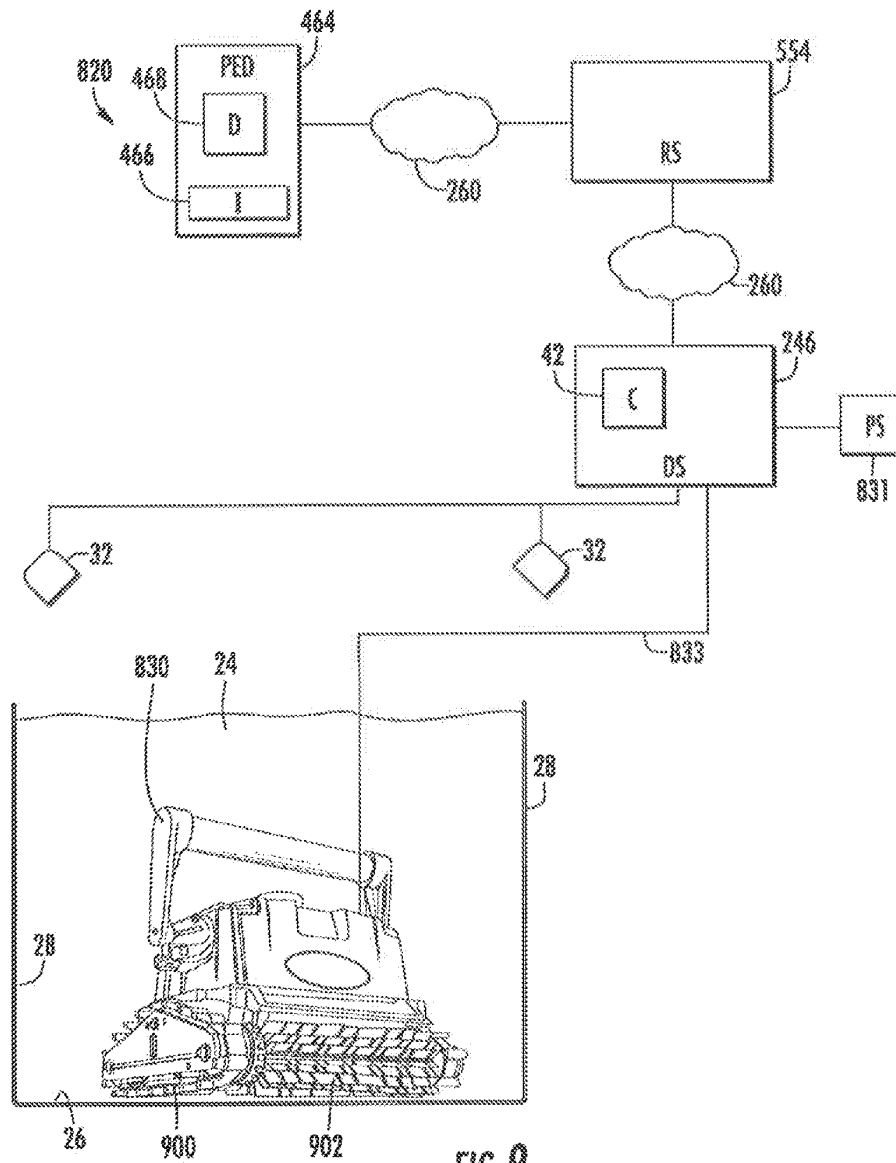
FIG. 8

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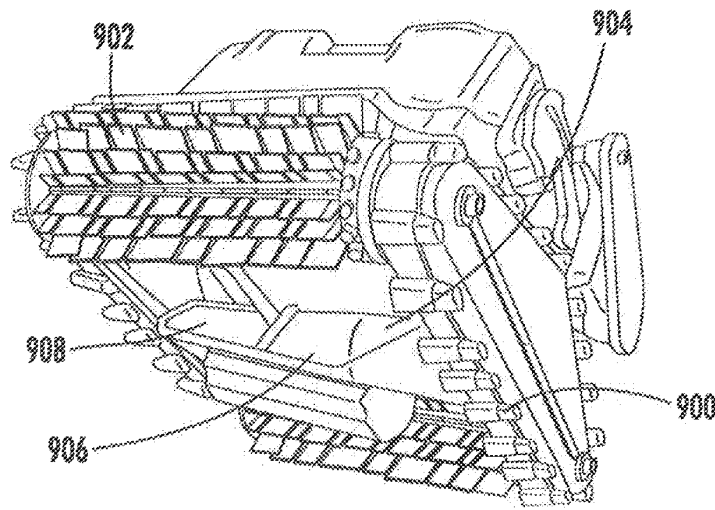


FIG. 10

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**POOL CLEANING SYSTEM AND METHOD
TO AUTOMATICALLY CLEAN SURFACES
OF A POOL USING IMAGES FROM A
CAMERA**

**CROSS-REFERENCE TO RELATED
APPLICATION**

This application is a continuation of allowed U.S. patent application Ser. No. 17/143,624, filed Jan. 7, 2021, which is a continuation of U.S. patent application Ser. No. 16/919,750, filed Jul. 2, 2020 (now U.S. Pat. No. 11,003,191), which is a continuation of U.S. patent application Ser. No. 16/416,840, filed May 20, 2019 (now U.S. Pat. No. 10,739,785), which is a continuation of U.S. patent application Ser. No. 15/973,983, filed May 8, 2018 (now U.S. Pat. No. 10,338,599), which is a continuation of U.S. patent application Ser. No. 15/207,065, filed Jul. 11, 2016 (now U.S. Pat. No. 9,995,051), which is a continuation of U.S. patent application Ser. No. 13/545,918, filed Jul. 10, 2012 (now U.S. Pat. No. 9,388,595), the contents of all of which are incorporated herein by reference in their entireties.

BACKGROUND

Manually cleaning the floor and sides of a swimming pool may be a tedious and time-consuming task. As a result, automated robotic pool cleaners have been developed. However, controlling and monitoring such automated robotic pool cleaners to insure that all portions of the pool surfaces are satisfactorily cleaned remains a challenge.

SUMMARY OF THE INVENTION

The disadvantages heretofore associated with the prior art are overcome by the present invention of a pool cleaning system for cleaning debris from a submerged surface of a swimming pool comprising: a self-propelled pool cleaner having rotatably-mounted supports for supporting and guiding the cleaner on the pool surface; a filter configured to retain the debris collected from the submerged surface of the swimming pool; an electric motor for enabling the rotation of the rotatably-mounted supports on the pool surface; at least one camera to capture imagery of the pool surface; a controller, in electronic communication with the at least one camera, to determine a cleanliness characteristic of the pool surface on which the cleaner has passed based on the camera imagery and generate a control signal to direct movement of the cleaner based on the cleanliness characteristic of the pool surface; and a portable electronic device is configured to present a graphic on a display, the graphic depicting the submerged surface of the pool and those portions of the surface that remain uncleaned as the cleaner traverses the pool surface.

In one aspect, the at least one camera is carried by the cleaner. In another aspect, the controller is carried by the cleaner. In still another aspect, the electric motor is mechanically connected to at least one of the rotatably-mounted supports.

In yet another aspect, the controller is operable to execute one or more cleaning programs for cleaning the submerged surfaces of the pool. In one aspect, the control signal causes the cleaner to drive in a direction to clean a portion of the pool surface based on the cleanliness characteristic of the pool surface. Alternatively, the control signal causes the cleaner to steer in a direction to clean a portion of the pool surface based on the cleanliness characteristic of the pool

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surface. In another aspect, the control signal causes the cleaner to drive in a direction to re-clean a portion of the pool surface over which the cleaner has passed. Alternatively, the control signal causes the cleaner to steer in a direction to re-clean a portion of the pool surface over which the cleaner has passed.

In one aspect, the captured imagery from the at least one camera is digitally processed by the controller to determine the cleanliness characteristic of the pool surface. Alternatively, the captured imagery from the at least one camera is digitally processed by a remote processor to determine the cleanliness characteristic of the pool surface.

In another aspect, the system further comprises a dry station located remotely from the cleaner and in communication with the cleaner, wherein the dry station includes the controller. Alternatively, the system further comprises a dry station located remotely from the cleaner and in communication with the cleaner, wherein the controller is located remotely from the cleaner and the dry station. In still another aspect, the controller controls electric power provided to the electric motor.

In one aspect, the control signal causes the cleaner to move in a direction of a portion of the pool surface to be cleaned based solely upon signals received from the camera.

In another aspect, the control signal causes the cleaner to drive in a direction to clean a portion of the pool surface based on the cleanliness characteristic of the pool surface. Alternatively, the control signal causes the cleaner to steer in a direction to clean a portion of the pool surface based on the cleanliness characteristic of the pool surface. In yet another aspect, the control signal causes the cleaner to drive in a direction to re-clean a portion of the pool surface over which the cleaner has passed. Alternatively, the control signal causes the cleaner to steer in a direction to re-clean a portion of the pool surface over which the cleaner has passed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of an example pool cleaning system.

FIG. 2 is a schematic illustration of an implementation of the pool cleaning system of FIG. 1.

FIG. 3 is a schematic illustration of an implementation of the pool cleaning system of FIG. 1.

FIG. 4 is a schematic illustration of an implementation of the pool cleaning system of FIG. 1.

FIG. 5 is a schematic illustration of an implementation of the pool cleaning system of FIG. 1.

FIG. 6 is a flow diagram of an example method that may be carried out with the pool cleaning system of FIG. 2-5.

FIG. 7 is a plan view of an example display with an example graphical depiction.

FIG. 8 is a plan view of another example display with an example graphical depiction.

FIG. 9 is a schematic illustration of an implementation of the pool cleaning system of FIG. 1 with an example pool cleaning vehicle.

FIG. 10 is a bottom perspective view of the example pool cleaning vehicle of the system of FIG. 9.

**DETAILED DESCRIPTION OF THE EXAMPLE
EMBODIMENTS**

FIG. 1 schematically illustrates an example pool cleaning system 20. As schematically shown by FIG. 1, pool cleaning system 20 is adapted to clean submerged surfaces of a pool 22 containing a liquid 24. In particular, pool cleaning system

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20 is adapted to clean at least a bottom or floor surface 26 of the pool 22 and possibly to additionally clean surfaces 28 of pool 22. As will be described hereafter, pool cleaning system facilitates the control and monitoring of a robotic pool cleaner to better assure that all portions of pool 22 are satisfactorily cleaned.

Pool cleaning system 20 comprises vehicle 30, cameras 32 and controller 42. Vehicle 30 comprises an automated powered device configured to travel adjacent to submerged or water containing surfaces of pool 20 (such as floor 26 and/or side surfaces 28) while cleaning such surfaces. In one implementation, vehicle 30 may include vacuum or suction devices, a liquid circulation system and a filter to draw debris, such as bacterial growth or plant growth, from such pool surfaces, wherein the drawn liquid containing such residue or foreign matter is filtered to collect the debris. In other implementations, vehicle 30 may not collect such debris, wherein vehicle 30 merely loosens such debris on the pool surfaces such that the loosened or separated debris may be subsequently removed using the existing liquid filtering system of pool 22.

To assist in the loosening of debris, in one implementation, vehicle 30 may additionally include a chemical dispenser to closely apply pool cleaning chemicals to the pool surfaces as the vehicle 30 traverses such surfaces. In one implementation, vehicle 30 may additionally or alternatively include one or more scrubbing members, such as active (driven) or passive (undriven or idling) brushes, to assist in the removal of residue or foreign matter from such pool surfaces. In yet another implementation, vehicle 30 may additionally or alternatively include liquid jets to assist in the loosening of debris.

To move along the submerged surfaces of pool 22, vehicle 30 includes one or more propulsion mechanisms. In one implementation, vehicle 30 is propelled along the submerged pool surfaces using wheels, rollers, tracks or other surface contacting members powered by a motor and the like. Such wheels, rollers or tracks may themselves include the scrubbing members used to clean the surfaces. In one implementation vehicle 30 may also alternatively be propelled by means of the vacuum or liquid jet. The vacuum or liquid jets used for such propulsion nozzle facilitate loosening of debris for collection by vehicle 30. In other implementations, vehicle 30 may include other propulsion mechanisms.

Cameras 32 comprise devices configured to capture video or time lapse images of pool 22. In the example illustrated, cameras 32 are mounted on structures external to pool 22. In other words, cameras 32 are not submerged. In other implementations, cameras 32 may alternatively be mounted to vehicle 30. In the example illustrated, cameras 32 capture movement of vehicle 30 while vehicle 30 is submerged within pool 22. In other implementations, cameras 32 merely capture images of submerged surfaces 26, 28 of pool 22.

In the example illustrated, cameras 32 comprise cameras serving as part of a home or pool security system, wherein such cameras detect the presence of a person at pool 22 satisfying a predefined characteristic and wherein an alert is output upon the person's detected presence. For example, in one implementation, cameras 32 are utilized as part of a security system that detects when a person below a predefined age, such as a child, is present at pool 22 without a detected presence of a recognized adult. In another implementation, cameras 32 may detect the presence of an unauthorized person or intruder at pool 22. Identification of the person may be achieved by an off-site human or computer-

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ized monitoring system, wherein signals from cameras 32 are transmitted across a wide area network or may be achieved with software of controller 42 which includes facial recognition or other identification programming.

Because pool cleaning system 20 utilizes pre-existing cameras 32 provided as part of a security system or shares the use of cameras 32 with such a home or pool security system, pool cleaning system 20 is easier to set up, less complex and less expensive. In other implementations, pool cleaning system 20 may utilize dedicated cameras 22 independent of any cameras associated with a home, facility or pool security system. In such an alternative system, cameras 32 may be more precisely focused upon pool 22 and surfaces 26, 28 while also including appropriate lenses or modifications to account for glare, refraction and the like to better facilitate the capture of surfaces and vehicle 30 which are submerged.

Controller 42 comprises one or more processing units in communication with vehicle 30 and cameras 32. For purposes of this application, the term "processing unit" shall mean a presently developed or future developed processing unit that executes sequences of instructions contained in a memory. Execution of the sequences of instructions causes the processing unit to perform steps such as generating control signals. The instructions may be loaded in a random access memory (RAM) for execution by the processing unit from a read only memory (ROM), a mass storage device, or some other persistent storage. In other embodiments, hard wired circuitry may be used in place of or in combination with software instructions to implement the functions described. For example, controller 42 may be embodied as part of one or more application-specific integrated circuits (ASICs). Unless otherwise specifically noted, the controller is not limited to any specific combination of hardware circuitry and software, nor to any particular source for the instructions executed by the processing unit.

In one implementation, controller 42 communicates with vehicle 30 and cameras 32 entirely across a wired connection. In another implementation, controller 42 communicates with vehicle 30 and cameras 32 across a wireless connection, such as across a local area network (LAN) or a wide area network (WAN) such as the Internet. One of limitation, controller 42 may communicate with vehicle 30 and cameras 32 using a combination of both wired and wireless communication connections.

Controller 42 is configured to generate control signals for steering vehicle 30 based upon signals received from cameras 32. In one implementation, controller 42 provides the sole steering directions for vehicle 30 using signals from cameras 32. Because vehicle 30 is precisely steered under the control of controller 42, rather than traveling in a random manner, entire summer surfaces of pool 22 may be more quickly and efficiently covered and cleaned. Because controller 42 provides the only steering instructions for vehicle 30 and utilizes signals from cameras 32, complex steering algorithms or codes in either vehicle 30 or controller 42 may be omitted to reduce complexity and cost of system 20.

In another implementation, vehicle 30 may cover or travel across surfaces of pool 22 in either a random fashion or according to an automated pool coverage algorithm or pool coverage pattern stored in a memory associated with vehicle 30 or controller 42. In such an implementation, controller 42 utilizes signals from cameras 32 to verify that all of the surfaces of 22 have been cleaned, that no spots have been missed. Upon identifying a missed spot, controller 42 utilizes signals from camera 32 to steer vehicle 32 over such missed portions of surfaces 26, 28. According to one

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example, controller 42 not only uses signals from camera 32 to determine whether any portions of surfaces 26, 28 have been missed entirely, but to also determine whether any portions of surfaces 26, 28 have been cleaned, but not to a satisfactory degree or extent. In such circumstances, controller 42 uses signals from cameras 32 to steer vehicle 34 such areas to re-clean such portions until such portions have been satisfactorily cleaned such that the portions have a cleanliness characteristic satisfying a predefined threshold.

FIG. 2 schematically illustrates pool cleaning system 120, the particular example of pool cleaning system 20 described above. Pool cleaning system 120 is similar to pool cleaning system 20 except that pool cleaning system 120 additionally comprises dry station 46 and display 50. Those remaining components of pool cleaning system 120 which correspond to components of pool cleaning system 20 are numbered similarly.

Dry station 46 comprises a station in communication with vehicle 30 and cameras 32 outside of pool 22. Dry station 46 incorporates controller 42. In one implementation, dry station 46 communicates with vehicle 30 in a wired fashion. In such an implementation, dry station 46 further provides electrical power to vehicle 30 in a wired fashion. Dry station 46 communicates with cameras 32 and either a wired or wireless fashion.

Display 50 comprises a device to present a graphical images and text on a display screen. In one implementation, display 58 may be incorporated as part of dry station 46. In another implementation, display 50 may be provided on a portable electronic device, a computer, a television and the like. Display 50 is utilized by pool cleaning system 120 to present information regarding the cleaning of pool 22 to facilitate control of vehicle 30 by controller 42. In one implementation, display 50 is utilized by pool cleaning system 120 and a controller 42 to present a graphical depiction of those portions of surfaces 26, 28 of pool 22 have not been satisfactorily cleaned so as to satisfy a predefined cleanliness characteristic threshold. Such portions may comprise portions that have been completely missed by vehicle 30 as well as those portions that have been covered by vehicle 30 but have not been satisfactorily cleaned with the given number of passes of vehicle 30 or the existing cleaning settings of vehicle 30. The graphical depiction presented on display 50 enables a person view the quality of the prior cleaning session and to input commands causing controller 42 to generate control signals using signals from camera 32 to steer vehicle 30 back to such identified portions where such portions may be cleaned at the same or elevated cleaning aggressiveness settings.

Another implementation, display 50 may be further utilized by controller 42 to depict the progress of vehicle 30 in cleaning pool 22. Such a display 50 allows a person to visually determine how much of the pool has been currently cleaned and to estimate the remaining time before the pool cleaning task is completed. In certain circumstances, using display 50, a person may adjust a setting of vehicle 30 to accelerate a rate at which surfaces 26, 20 of pool 22 are cleaned to meet an earlier desired completion time for such pool cleaning.

FIG. 3 schematically illustrates pool cleaning system 220, another example implementation of pool cleaning system 20. Pool cleaning system 220 is similar to pool cleaning system 20 except that pool cleaning system 220 additionally comprises dry station 246, display 50, and remote server 254. Those remaining components of pool cleaning system

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220 which correspond to components of pool cleaning system 20 or pool cleaning system 120 are numbered similarly.

Dry station 246 is similar to dry station 46, described above, except that dry station 246 serves as a local interface for communication with controller 42 across a network 260. In one implementation, network 260 may comprise a local area network. In another implementation, network 260 may comprise a wide area network, such as the Internet. For example, in one implementation, dry station 246 may incorporate a modem. In one implementation, dry station 246 may communicate across a local area network to controller 42. In another implementation, dry station 246 may communicate through a router, across a local area network, to a local modem which communicates across a network 260. The example illustrated, dry station 246 further provides part of vehicle 30 across a wired cable or wired connection. Display 50 is described above with respect to system 120.

Remote server 254 comprises a server remote from dry station 246 which is in communication with dry station 246 across network 260. Remote server 254 includes controller 42. During operation, signals from cameras 32 are transmitted across dry station 246 across network 260 to controller 42 of remote server 254. Based upon such signals from cameras 32, controller 42 generates control signals which are transmitted back across network 260 and through dry station 246 to vehicle 30 to steer vehicle 30.

As shown by FIG. 3, remote server 254 and network 260 may be shared as part of other pool cleaning systems 320, wherein controller 42 generates control signals for steering the pool cleaning vehicle 30 of system 320 based upon signals from cameras 32 transmitted across dry station 246 of system 320. In such an implementation, the cost and complexity of pool cleaning system 220 is reduced since controller 42 is remotely provided at remote server 254 which services multiple pool cleaning systems 220, 320. Upgrades to controller 42 and its software are also more easily achieved for all pool cleaning systems to 20, 320 and their pools 22, 222 being serviced. In one implementation, the supervised cleaning, inspection and possible re-cleaning facilitated by the use of cameras 32 may be provided as part of a subscription to users of vehicle 30. In such an implementation, a pool 22 having security cameras 32 may be upgraded with appropriate software or an appropriate software module added to dry station 246 to make a network connection with controller 42 which directs the security cameras 32 to capture vehicle 30 utilizes such signals for steering vehicle 30.

FIG. 4 schematically illustrates pool cleaning system 420, another particular implementation of pool cleaning system 20. Pool cleaning system 420 is similar to pool cleaning system 120 except that pool cleaning system 420 additionally comprises a portable electronic device 464. Those remaining components of pool cleaning system 420 which correspond to components of pool cleaning system 120 are numbered similarly.

Portable electronic device 464 comprises a portable handheld electronic device in communication with controller 42 and/or dry station 46 across network 260. Examples of such a portable electronic device (PED) 300 include, but are not limited to, a smart phone, a personal data assistant (PDA), laptop, notebook computer, tablet computer (e.g. IPAD) and MP3 player (e.g., IPOD TOUCH). In the example illustrated, PED 464 comprises input 466 and display 468.

Input 466 serves as a user interface for PED 464 by which inputs are made to PED 464. Input 466 facilitates entry of inputs or commands by a person to cause controller 42 to

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generate control signals varying the control of vehicle 30. In one implementation, input 466 comprise a keyboard. In other implementations, input 466 may comprise a touchpad, a stylus, a microphone with associated speech recognition software or programming, a touch screen, buttons, switches and the like. In some implementations, input 466 may comprise a touch screen incorporated as part of display 468.

Display 468 comprises a user interface by which graphical or textual data is presented to a user. Display 468 may present the same or similar information as presented at dry station 246 by display 50 as described above. In one implementation, display 468 comprises a liquid crystal display. In other implementations, display 468 may comprise other types of display technology such as a light emitting diode display, an organic light emitting diode display (OLED), an electronic ink (e-ink) display or other types of display technology in present use or developed in the future. Although system 420 is illustrated as including controller 422 is part of dry station 46, in some implementations, controller 42 may alternatively be located as part of PED 464.

PED 464 enables a person located remote from pool 22 to monitor the progress of the cleaning of pool 22 by vehicle 30 of system 420. PED 464 provides a person with a graphical presentation (described above with respect to display 50) indicating those portions of surfaces 26, 28 of pool 22 that have been completed as well as those portions 26, 20 and that remain to be cleaned. The person may also be provided with a graphical indication of what portions need to be re-cleaned to meet predetermined cleanliness thresholds. In the example illustrated, input 466 enables a person to enter commands or selections which are transmitted across network 260 to controller 42 to adjust operation of vehicle 30. For example, the path or route of vehicle 30 may be changed, the aggressiveness of the cleaning chemicals or mechanical cleaning devices may be adjusted, the speed at which vehicle 30 traverses surfaces 26, 28 may be adjusted. In response to such adjustment signals from PED 464, controller 42 may utilize signals from cameras 32 to adjust the steering of vehicle 30.

FIG. 5 schematically illustrates pool cleaning system 520, another example implementation of pool cleaning system 20. Pool cleaning system 520 is similar to pool cleaning system 420 except that pool cleaning system 520 additionally comprises a remote server 554. Those remaining components of pool cleaning system 520 which correspond to components of pool cleaning system 420 are numbered similarly.

Remote server 554 is similar to remote server 254 described above with respect to system 220. Remote server 554 comprises a server remote from dry station 246 which is in communication with dry station 246 across network 260. Remote server 254 includes controller 42. During operation, signals from cameras 32 are transmitted across dry station 246 across network 260 to controller 42 of remote server 254. Based upon such signals from cameras 32, controller 42 generates control signals which are transmitted back across network 260 and through dry station 246 to vehicle 30 to steer vehicle 30. Controller 42 further relays either the raw signals from camera 32 or image signals generated based upon signals from cameras 32 to PED 464, wherein such images (described above) are presented on display 468. As noted above, PED may further receive commands through input 466, wherein such commands are transmitted to controller 42 which generates control signals that are ultimately transmitted to vehicle 30 for steering vehicle 30.

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As with remote server 254, remote server 554 and network 260 may be shared as part of other pool cleaning systems 320 (shown in FIG. 3), wherein controller 42 generates control signals for steering the pool cleaning vehicle 30 of system 320 based upon signals from cameras 32 transmitted across dry station 246 of system 320. In such implementations, controller 42 of remote server 554 may interact with other PEDs 464. In such an implementation, the cost and complexity of pool cleaning system 220 is reduced since controller 42 is remotely provided at remote server 254 which services multiple pool cleaning systems 220, 320. Upgrades to controller 42 and its software are also more easily achieved for all pool cleaning systems to 20, 320 and their pools 22, 222 being serviced. In one implementation, the supervised cleaning, inspection and possible re-cleaning facilitated by the use of cameras 32 may be provided as part of a subscription to users of vehicle 30. In such an implementation, a pool 22 having security cameras 32 may be upgraded with appropriate software or an appropriate software module added to dry station 246 to make a network connection with controller 42 which directs the security cameras 32 to capture vehicle 30 utilizes such signals for steering vehicle 30. As indicated by broken lines, in other implementations, the controller 42 for generating control signals steering vehicle 30 based upon signals from cameras 32 may alternatively be relocated in PED 464.

FIG. 6 is a flow diagram illustrating an example method 600 that may be carried out by any of systems 120-520. As indicated by step 602, cameras 32 capture images of pool cleaning by vehicle 30. As indicated by step 604, controller 42 obtain such signals from cameras 32 for the surfaces of pool 22 that have been cleaned. As indicated by step 606, controller 42 uses information gathered from the signals from cameras 32 to identify those portions of surfaces 26, 28 not satisfactorily cleaned not satisfying a predefined cleanliness characteristic or measurement threshold. One example of a cleanliness characteristic measurement a threshold may be how well the color of a surface matches a predetermined desirable color for the pool surface (such as original color of the tile or surface). A surface that has been missed entirely by vehicle 30 during a pool cleaning session may be automatically deemed to not satisfy a predetermined cleanliness characteristic.

As indicated by step 608, based upon such determinations, controller 42 generates control signals resulting in the presentation of a graphical depiction of those portions of pool 22 that has not been satisfactorily cleaned. Such graphical representations or depictions may be presented on display 50 or display 468. FIGS. 7 and 8 illustrate examples of graphical depictions that may be presented.

FIG. 7 illustrates display 468 presenting graphical depiction 620. Graphical depiction 620 comprises a first graphic 622 having a first portion 624 representing sides or walls 28 of pool 22 and a second portion 626 representing the floor 26 of pool 22. Graphical depiction 620 further comprises a moving icon 628 representing the current positioning of vehicle 30. In one implementation, the path of vehicle 30 may additionally be depicted by icon 628 shown in broken lines. As shown by FIG. 7, those portions 632 of surfaces 26, 28 of pool 22 (shown in FIG. 1) over which of vehicle 30 has moved are identified by graphical depiction 620 either by color, markings or other various distinctive attributes. Likewise, those portions 634 of surfaces 26, 28 of pool 22 that have not been covered by vehicle 30 are identified by a distinct color col marking or distinctive attribute of depiction 620. As a result, a person may view the current position of vehicle 30, the extent to which pool 22 has been cleaned

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or covered by vehicle 30 and the extent of pool 22 that remains to be cleaned. In the example illustrated, depiction 620 further identifies those portions 638 of surfaces 26, 28 that have been cleaned, but which have not been cleaned to a satisfactory degree or extent. In one implementation, portions 638 may be identified by colors, brightness, markings or other visually distinctive attributes that are visually distinct from both portions 632 and portions 634. In other implementations, portions 638 may have the same characteristic of portions 634. In yet other implementations, different portions 638 may have different visual attributes depending upon a degree to which such clean portions have failed to satisfy the predefined cleanliness characteristic threshold. In some implementations, different port 638 may have different visual attributes depending upon different cleaning strategies that may be recommended for the different portions 638. For example, controller 42 may determine and recommend a first cleaning strategy (a first chemical solution jetted at a first rate and scrubbed at a first rate) with respect to a first portion 638 and may recommend a second different cleaning strategy (a second chemical solution jetted at a second rate is about a second rate) with respect to a second portion 638, wherein the different cleaning strategies are represented by different visual attributes presented in depiction 620.

FIG. 8 illustrates display 468 presenting a graphical depiction 720. Graphical depiction 720 comprises a first graphic 622 having a first portion 624 representing sides or walls 28 of pool 22 and a second portion 626 representing the floor 26 of pool 22 (shown in FIG. 1). Graphical depiction 720 is similar to graphical depiction 620 except that graphical depiction 720 omits icon 628 presenting vehicle 30. Like depiction 620, depiction 720 graphically depicts those portions 632 of surfaces 26, 28 over which vehicle 30 has traveled while in a cleaning mode. Depiction 720 also visually depicts those portions 634 that have not been covered by vehicle 30 in the cleaning mode and those portions 638 over which vehicle 30 has traveled while in the cleaning mode, but which have not been cleaned to a satisfactory degree. As illustrated in FIG. 8, different portions 638 may be visibly distinguished from one another through color, text or markings indicating either differences in the cleanliness of such portions 638 or indicating different recommended cleaning strategies or approaches that may be selected by a person using input 466 when vehicle 30 is steered back to such portions 638 for re-cleaning using signals from camera 32.

As indicated by step 610 of FIG. 6, controller 42 generates control signals steering vehicle 30 to re-clean portions of pool 22, such as portions 638. Such steering may be facilitated by using signals from cameras 32. As noted above, in some implementations, a person may be allowed Choose a cleaning approach for a particular portion 638 using input 466. The selection may be facilitated by visual inspection of the different visual attributes for the particular portion 638 provided by depiction 720 (or depiction 620). In some implementations, input 466 may additionally be utilized by a person to prioritize an order in which portions 638 are re-cleaned.

FIG. 9 illustrates pool cleaning system 820, an example implementation of pool cleaning system 20. Pool cleaning system 820 is similar to pool cleaning system 520 except the pool cleaning system 820 located controller 42 in dry station 246 and includes pool cleaning vehicle 830, a specific example of vehicle 30. As shown by FIG. 9, in addition to transmitting control signals generated by controller 42 to vehicle 830, dry station 246 further transmits power from

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power source 831 through a power line or power cable 833 to vehicle 830. In the example illustrated, data communication and communication of control signals, also occurs across wired connections within or alongside the same line 833. In the example illustrated, remote server 554 serves as a communication link by which upgrades to controller 42 may be implemented across a wide number of pool cleaning systems and by which information from controller 42 is conveyed to one or more portable electronic devices 464 across network 260.

Vehicle 830 comprises a robotic or automated pool cleaning device. Vehicle 830 comprises a self-contained onboard filtration system with drive and pump motors. Vehicle 830 utilizes an internal microprocessor guided drive motor to systematically clean surfaces of pool 22. As shown by FIGS. 9 and 10, vehicle 830 utilizes a toothed track drive 900 provide traction and propulsion for vehicle 30. Vehicle 830 comprises rotating brushes 902 to loosen waterline buildup and breakdown large debris while power washing jets 904 flush out dirt from pores, seems in corners where brushes 902 may not be able to reach. The loosened dirt and debris is vacuumed through off-center vacuum ports 906 which passes the vacuumed debris through internally house filter bag. In the example illustrated, vehicle 830 further comprises rollers 908 which inhibit vehicle 830 from becoming impeded or stuck on raised drains or pop-up heads. Although illustrated as being employed with system 820, vehicle 830 may also be utilized with any of systems 20, 120, 220, 320 and 420. In other implementations, other robotic or automated pool cleaning vehicles may be utilized.

Although the present disclosure has been described with reference to example embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the claimed subject matter. For example, although different example embodiments may have been described as including one or more features providing one or in ore benefits, it is contemplated that the described features may be interchanged with one another or alternatively be combined with one another in the described example embodiments or in other alternative embodiments. Because the technology of the present disclosure is relatively complex, not all changes in the technology are foreseeable. The present disclosure described with reference to the example embodiments and set forth in the following claims is manifestly intended to be as broad as possible. For example, unless specifically otherwise noted, the claims reciting a single particular element also encompass a plurality of such particular elements.

What is claimed is:

1. A self-propelled pool cleaning system 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 for capturing an image of at least a first object within the swimming pool; and
- e. a controller (i) in electronic communication with the at least one camera and (ii) 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 object.

2. A pool system comprising:

- at least one piece of equipment for a swimming pool or spa;

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one or more cameras configured to capture video or images of at least a portion of a location including the swimming pool or spa; and
a controller in communication with the at least one piece of equipment and the one or more cameras, the controller configured to receive visual data from the one or more cameras and determine a control action for the at least one piece of equipment based on the received visual data.

3. The pool system of claim 2, wherein the at least one piece of equipment comprises a cleaning device with one or more propulsion mechanisms, the cleaning device configured to travel adjacent to submerged or water-containing surfaces of the swimming pool or spa and to perform a cleaning operation.

4. The pool system of claim 2, wherein the one or more cameras are mounted external to the swimming pool or spa.

5. The pool system of claim 2, wherein the one or more cameras are mounted on the at least one piece of equipment.

6. The pool system of claim 2, wherein the one or more cameras are submergible or submerged within the swimming pool or spa.

7. The pool system of claim 2, wherein the controller is configured to detect a characteristic of the location based on the visual data and control the piece of equipment based on the detected characteristic.

8. The pool system of claim 7, wherein the characteristic comprises a cleanliness of a surface of the swimming pool, and wherein the controller is configured to control the piece of equipment based on the detected cleanliness being outside of a threshold.

9. The pool system of claim 2, wherein the controller is configured to communicate with the at least one piece of equipment and the one or more cameras via a wireless connection.

10. The pool system of claim 2, wherein the controller is further configured to present a graphical depiction on a remote device based on the received visual data as the control action.

11. The pool system of claim 2, wherein the controller is remote from the camera.

12. A method for monitoring a pool system, the method comprising:
receiving images of at least a portion of a location including a swimming pool or spa from one or more cameras;

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determining a target area and detecting a characteristic of the target area based on the images; and
generating a control response based on the detected characteristic of the target area.

13. The method of claim 12, wherein the target area comprises a portion of a surface of the swimming pool or spa, and wherein the characteristic comprises a cleanliness characteristic of the portion of the surface of the swimming pool or spa.

14. The method of claim 12, wherein generating the control response comprises controlling an operation of a piece of equipment of the swimming pool or spa.

15. The method of claim 12, wherein generating the control response comprises generating an alert on a remote device.

16. The method of claim 12, wherein generating the control response comprises wirelessly communicating with a piece of equipment for the swimming pool or spa or a remote device.

17. The method of claim 12, wherein generating the control response comprises prompting a user on a remote device, and wherein the method further comprises receiving a control input from the user on the remote device for controlling a piece of equipment of the swimming pool or spa.

18. The method of claim 17, wherein prompting the user comprises providing recommended cleaning strategies for a cleaning device based on the detected characteristic of the target area.

19. The method of claim 12, wherein generating the control response comprises controlling operation of a cleaning device configured to travel adjacent to submerged or water-containing surfaces of the swimming pool or spa and to perform a cleaning operation, wherein controlling operation of the cleaning device comprises one or more of controlling a path or route of the cleaning device, an aggressiveness of cleaning chemicals deployed, an aggressiveness of mechanical cleaning, or a speed of the cleaning device.

20. The method of claim 19, wherein the characteristic of the target area is a presence of a person at the swimming pool or spa, and wherein generating the control response is based on the detected presence of the person satisfying a predefined characteristic.

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