

ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES

BACKGROUND

[001] Embodiments of the invention described in this specification relate generally to surgical and operating room technology, and more particularly, to a mobile robot and docking station machine of a robotic essential surgical technologist system.

[002] Surgical procedures can be complex and lengthy and require a high degree of precision. Surgeons often need to rely on a team of healthcare professionals or surgical technicians to assist with surgical tools and equipment, while also managing the overall flow of the operation. However, this complex human arrangement can be time-consuming, prone to error, and expensive. Additionally, as medical demands increase, access to skilled surgical teams and facilities may become limited, further compounding these issues.

[003] According to the National Institute of Health (NIH), medical error is a leading cause of death in the United States. In the context of the operating room, there are a number of avenues through which medical errors could arise. For one, a crowded room with a number of medical professionals, assistants, and technologists can lead to congestion in the operating room which can produce accidents, lead to confusion, or cause misunderstandings. Further, the low level of automation in most operating rooms means that a procedure's success is entirely reliant on human performance. Finally, in a high-stake complex environment such as the operating room, miscommunication can easily occur and escalate potentially leading to devastating consequences.

[004] Existing automated solutions focus on specific aspects of our invention, such as handling surgical instruments for cleaning and/or packaging purposes, or robotic systems designed to locate, sterilize, sort, and deliver surgical tools before surgical procedures only. There are robots that supply sterile equipment for surgery but completely stay out of the operating room. Existing conventional technology is available for cleaning, disinfecting, and sanitizing such as ultrasonic cleaners, mechanical cleaners, and autoclaves but these tools are usually not integrated with each other and require substantial human labor simply for preparing surgical tools. No existing solution is fully integrated or designed to perform the job of a surgical technologist.

BRIEF DESCRIPTION

[005] A novel robotic essential surgical technologist (REST) system and associated processes are disclosed. The REST system is configured to handle and manage surgical instruments during surgical procedures in an operating room. In some embodiments, the REST system comprises (i) a small, detachable robot (referred to as the “mobile robot”) that is configured to quickly and accurately deliver surgical tools to a surgeon and carry out a comprehensive range of surgical-related tasks and (ii) a docking station machine that is configured to carry out post-surgery work such as cleaning, disinfecting, and sterilizing surgical tools after use. In some embodiments, the mobile robot is configured to attach to the docking station machine after each surgical procedure for cleaning of the surgical tools. Together, the mobile robot and the docking station machine are integrated to form the REST system and provide a comprehensive, fully automated solution that assists medical personnel before, during, and after each surgical procedure. Prior to and during surgery, the mobile robot is detached from the docking station machine and to engage in work activities of a surgical technologist, such as preparing surgical tools for a surgical procedure scheduled or anticipated during the surgery. After surgery, the mobile robot attaches to the docking station machine with the surgical tools used during the surgical procedure held in surgical tool cups of the mobile robot. After the mobile robot is attached, the docking station machine cleans, disinfects, and sterilizes the surgical tools held in the surgical tool cups of the mobile robot.

BRIEF DESCRIPTION OF THE DRAWINGS

[006] Having described the invention in general terms, reference is now made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

[007] **Figure 1** conceptually illustrates a front perspective view of a mobile robot of a robotic essential surgical technologist (REST) system in some embodiments.

[008] **Figure 2** conceptually illustrates a cross-sectional view of the mobile robot of the REST system in some embodiments.

[009] **Figure 3** conceptually illustrates a mobile robot deployment process during which the mobile robot is deployed for use during a surgical procedure in an operating room in some embodiments.

[0010] **Figure 4** conceptually illustrates a post-surgery cleaning process during which the mobile robot attaches to a docking station machine for power supply charging and cleaning of tools used during surgery in some embodiments.

[0011] **Figure 5** conceptually illustrates a post-cleaning surgery preparation process during which the mobile robot acquires procedures and tools for a particular surgical procedure and autonomously moves into position in the operating room in which the surgery will be conducted in some embodiments.

[0012] **Figure 6** conceptually illustrates a front view of a docking station machine of the REST system with the mobile robot attached to the docking station machine for charging and cleaning in some embodiments.

[0013] **Figure 7** conceptually illustrates a front sectional view of the docking station machine of the REST system in some embodiments.

[0014] **Figure 8** conceptually illustrates a top sectional view of the docking station machine with the mobile robot attached in some embodiments.

[0015] **Figure 9** conceptually illustrates a top view of the docking station machine with the mobile robot attached in some embodiments.

DETAILED DESCRIPTION

[0016] In the following detailed description of the invention, numerous details, examples, and embodiments of the invention are described. However, it will be clear and apparent to one skilled in the art that the invention is not limited to the embodiments set forth and that the invention can be adapted for any of several applications.

[0017] Embodiments of the invention described in this specification include a novel robotic essential surgical technologist (REST) system and associated REST processes. The REST system is configured to handle and manage surgical instruments during surgical procedures in an operating room. In some embodiments, the REST system comprises (i) a small, detachable robot (referred to as the “mobile robot”) that is configured to quickly and accurately deliver surgical tools to a surgeon and carry out a comprehensive range of surgical-related tasks and (ii) a docking station machine that is configured to carry out post-surgery work such as cleaning, disinfecting, and sterilizing surgical tools after use. In some embodiments, the mobile robot is configured to attach to the docking station machine after each surgical procedure for cleaning of the surgical tools. Together, the mobile robot and the docking station machine are integrated to form the REST system and provide a comprehensive, fully automated solution that assists medical personnel before, during, and after each surgical procedure. Prior to and during surgery, the mobile robot is detached from the docking station machine and to engage in work activities of a surgical technologist, such as preparing surgical tools for a surgical procedure scheduled or anticipated

during the surgery. After surgery, the mobile robot attaches to the docking station machine with the surgical tools used during the surgical procedure held in surgical tool cups of the mobile robot. After the mobile robot is attached, the docking station machine cleans, disinfects, and sterilizes the surgical tools held in the surgical tool cups of the mobile robot.

[0018] Embodiments of the REST system and processes described in this specification overcome the issues and solve the problems noted above by way of an intelligent, self-functioning (also referred to as “automated”) robotic system that is reliable and consistent in handling responsibilities and completing surgery-related tasks that would otherwise be handled manually by a surgical technologist, a scrub, or an operating room technician. In essence, the REST system (which is also interchangeably referred to as the “REST device”) performs the work of a human surgical technologist with a high degree of precision and reliability. At its core, the REST system features both (i) a small, detachable robot (i.e., the mobile robot) that delivers surgical tools quickly and accurately to a surgeon and (ii) a bigger machine that functions as a docking station for the REST system to carry out post-surgery work such as cleaning, disinfecting, and sterilizing surgical tools after use. The smaller mobile robot and the larger docking machine are integrated together to form a comprehensive, fully automated solution that assists medical personnel before, during, and after each surgical procedure.

[0019] In some embodiments, the REST system prepares surgical tools in advance of surgeries by way of a fully automated process. In this way, medical personnel do not have to take time to set up the surgery, streamlining the entire process. Furthermore, this allows surgeons and medical personnel to save crucial time in between surgeries and reduces wait times for patients. In addition to saving time for surgeons and others, the mobile robot has a small “footprint” (when detached from the docking station machine) which physically frees up space and eases congestion in the operating room. In addition, the REST system alleviates pressure and reliance on the performance of a human surgical technologist (or other personnel) through robotic automation that is precise and consistent. Monetarily, the REST system is a cheaper alternative to surgical technicians, who require years of training and experience. Overall, the REST system reduces the chance of human error in the operating room and enhances the likelihood of a successful surgery.

[0020] Embodiments of the REST system and processes described in this specification differ from and improve upon currently existing options. In particular, the existing options are designed to perform one particular case scenario and are not front-facing solutions that interface with medical personnel. Rather, the existing options are meant to operate in the background and

perform simple tasks associated with surgical tools like cleaning and packaging them. By contrast, the REST system provides an effect way of automating the responsibilities of a surgical technologist in the operating room via mobile robot. Moreover, the REST system is a comprehensive solution that prepares surgical tools for a surgical procedure, is present during surgery, performs the work of a surgical technologist, and also attaches to the docking station machine for self-cleaning that includes cleaning, disinfecting, and sterilizing the surgical tools used during the surgical procedure. In this way, the REST system improves surgical flow without obstruction by seamlessly integrating with existing surgical equipment and medical personnel.

[0021] The REST system of the present disclosure may be comprised of a mobile robot and a docking station, each of which may be comprised of the following components. This list of possible constituent components of the mobile robot and the docking station is intended to be exemplary only and it is not intended that this list be used to limit the REST system of the present application to just these components. Persons having ordinary skill in the art relevant to the present disclosure may understand there to be equivalent components or other elements that may be substituted within the present disclosure without changing the essential function or operation of the mobile robot and/or the docking station of the REST system.

[0022] In some embodiments, the mobile robot of the rest system comprises (i) a stainless steel base frame, (ii) an aluminum body frame (part of housing), (iii) a polycarbonate housing (part of housing), (iv) a plurality of swerve modules with encoders (four), (v) a screen and information module, (vi) an elevator system comprising a plurality of elevator system modules for a plurality of individual surgical cups (eight), (vii) a turntable system comprising a motor, a gear set, an encasing, and small roller bearings, (viii) a plurality of electronic components comprising a computing device, a control system, a power supply, and computer wiring, (ix) a plurality of drive sensors comprising a front laser module and a rear proximity sensor, (x) a cover plate, (xi) an operation panel, (xii) a status light, (xiii) a surround speaker system comprising a plurality of speakers, and (xiv) a charging dock. In some embodiments, each swerve module comprises a drive motor, a steering motor, a gear module, a gear set encoder, and a billet wheel. In some embodiments, the screen and information module comprises a mount, a display, and a backplate, and a camera. In some embodiments, each elevator system module comprises a motor, a gear set, a linear slide, and a mount to which each individual surgical cup attaches.

[0023] In some embodiments, the docking station of the rest system comprises (i) a stainless steel base frame, (ii) a stainless steel body frame, (iii) a steel housing, (iv) an ultrasonic

cleaner, (v) a mechanical cleaner, (vi) an autoclave pressure chamber, (vii) a collection assembly, (viii) a charging dock receiver, (ix) a control panel, and (x) a custom lid attachment. In some embodiments, the ultrasonic cleaner comprises an ultrasonic encasing, an ultrasonic tank, an ultrasonic stainless steel rack, temperature controllers, an ultrasonic transducer, an ultrasonic generator, an ultrasonic drain valve, an ultrasonic board, and an ultrasonic power supply. In some embodiments, the mechanical cleaner comprises a mechanical cleaner encasing, a mechanical cleaner (stainless steel) rack, a mechanical cleaner spray arm, a mechanical cleaner heat element, a mechanical cleaner drain valve, and a mechanical cleaner power supply. In some embodiments, the autoclave pressure chamber comprises an autoclave steam generator, an autoclave vacuum generator, an autoclave drain valve, and an autoclave power supply. In some embodiments, the collection assembly comprises a plurality of linear rails (X-rail, Y-rail, Z-rail), a plurality of motors (X-motor, Y-motor, Z-motor), a carriage mount, and a custom claw.

[0024] The various elements of the REST system of the present disclosure may be related in the following exemplary fashion. It is not intended to limit the scope or nature of the relationships between the various elements and the following examples are presented as illustrative examples only.

[0025] For the mobile robot, reference is made to **Figures 1 and 2**.

[0026] As shown in these figures, the mobile robot 10 has a stainless steel base frame 12 that is attached to a housing 14 with an aluminum body frame (which makes the skeleton for the housing) and a polycarbonate covering of the housing 14. Four swerve modules 20 are connected to each corner of the base frame 12 to form a drive-train. Each swerve module 20 includes a billet wheel, a drive motor 50C, a steering motor 50D, a gear module 50B, a gear set 50A, and an encoder 50E. On top of the base frame 12 are several electronic components including a computing device 44 (also referred to as the “CPU 44”), a power supply 40, a control system 38, and electrical wiring between them. An elevator system and turntable system are mounted on the aluminum body frame of the housing 14. The turntable system includes several turntable components including a turntable motor 48A, a turntable gear set 48B, a turntable encasing 48C, and a set of turntable small roller bearings 48D. The elevator system resides on top of the turntable system and includes eight separate modules, each of which is connected to a separate surgical tool cup 46. Specifically, each elevator system module includes an elevator system motor 42A, an elevator system gear set 42B, an elevator system linear slide 42C, and an elevator system mount 42D. A screen and information module can be found attached to the very top of the aluminum

frame of the housing 14. The screen and information module comprises of a backplate 28, a mount 18 that is attached to the body frame housing 14 and the backplate 28, a display 34 that is attached to the backplate 28 and is oriented to face out, and a camera 32 at the top of the mount 18. A cover plate 16 is attached to the top of the mobile robot where an operation panel 24 and a status light 30 are found. On the exterior portion of the polycarbonate housing 14, a surround speaker system is attached. The speaker system includes a plurality of surround speakers 36. In some embodiments, the plurality of surround speakers 36 comprise four speakers 36. Drive sensors are also connected to the housing 14 on opposite sides, with a front laser module drive sensor 26 and a rear proximity drive sensor opposite and externally disposed along the housing 14. Finally, a charging dock 22 is disposed along the bottom of the mobile robot, attached to the stainless steel base frame 12, and exposed through an opening on the housing 14.

[0027] For the docking station, reference is made to **Figures 6-9**.

[0028] As shown in these figures, the docking station has a stainless steel body frame (DS-16) that is attached to a stainless steel base frame (DS-15) to which a steel housing (DS-17) is mounted. The docking station is primarily composed of a collection unit—that is, a linear rail collection assembly (DS-21) that performs a collection mechanism for the docking station—and three cleaning stations, namely, an ultrasonic cleaner (DS-18), a mechanical cleaner (DS-19), and an autoclave (DS-20).

[0029] The ultrasonic cleaner (DS-18) is attached to the stainless steel body frame (DS-15) and includes the ultrasonic encasing (DS-18a). Within the ultrasonic encasing (DS-18a) is the ultrasonic transducer (DS-18e), the ultrasonic generator (DS-18f), the ultrasonic board (DS-18h), and the ultrasonic power supply (DS-18i). The ultrasonic tank (DS-18b) and the ultrasonic drain valve (DS-18g) within the tank (DS-18b) attach to the top of the ultrasonic encasing (DS-18a), leveled with the top of the body frame (DS-16) and steel housing (DS-17) of the docking station machine. Additionally, the ultrasonic stainless steel rack (DS-18c) is positioned inside the ultrasonic tank (DS-18b). Temperature controls (not shown in these figures but referenced as DS-18d) are found in the front part of the ultrasonic encasing (DS-18a).

[0030] The mechanical cleaner (DS-19) is attached to the main body frame (DS-16). The mechanical cleaner (DS-19) includes the mechanical cleaner encasing (DS-19a) inside of which the mechanical cleaner stainless steel rack (DS-19b), the mechanical cleaner spray arm (DS-19c), the mechanical cleaner heat element (DS-19d), and the mechanical cleaner drain valve (DS-

19e) are found. The mechanical cleaner power supply (DS-19f) is attached to the mechanical cleaner encasing (DS-19a).

[0031] The autoclave (DS-20) is also attached to the main body frame (DS-16) and includes the autoclave pressure chamber (DS-20a), the autoclave steam generator (DS-20b), the autoclave vacuum generator (DS-20c), the autoclave drain valve (DS-20d), and the autoclave power supply (DS-20e).

[0032] Finally, the collection unit (DS-21) is attached to the body frame (DS-16) of the docking station and is made of a system of linear rails (DS-21a), in the X (DS-21ai), Y (DS-21aii), and Z (DS-21aiii) directions plus their corresponding powering motors (DS-21b), X-motor (DS-21bi), Y-motor (DS-21bii), and Z-motor (DS-21biii), as well as the carriage (DS-21c). The custom claw attachment (DS-21e) and the custom lid (DS-24) are attached to the mount (DS-21d) held by the carriage (DS-21c). The charging dock receiver (DS-22) can be found attached to the base frame (DS-15). The control panel (DS-23) sits on top of the housing (DS-17).

[0033] The REST system of the present disclosure generally works before, during, and after a scheduled surgical procedure. Specifically, the mobile robot of the REST system would deploy, fully charged, from the docking station. To deploy, the custom lid attachment along with the custom claw would unlock and unseal from the top of the mobile robot and be lifted up by the rail system, specifically by the Z-rail and Z-motor. Once the carriage holding the lid and claw is out of the way, the mobile robot would head to its assigned “parking zone” right next to the surgical bed. The mobile robot then would initialize the protocol and load the adequate steps for the specific procedure. The steps for the procedure would be displayed on the main screen and the mobile robot would (normally, but not definitely) lock into a position ready for use. At this point, the surgeon, an assistant surgeon, a nurse, and other medical personnel would enter the room. If not locked into position, the mobile robot would be capable of navigating the room with humans in it given its navigational capabilities resulting from the front laser module, the rear proximity sensor, and the front-facing camera. Once the medical personnel and other operating room staff are fully set up and ready to go, the mobile robot starts a timer and gets in “operation mode” via voice commands. The mobile robot could display a timer on the main screen as well as the name of the procedure taking place, a current inventory of tools, and an expected usage flow. The surgeon or assistant surgeon would simply need to request surgical tools via voice commands by saying a prompt word, such as “REST”, followed by a command (e.g., “hand me the scalpel”). The mobile robot would then identify the appropriate surgical tool cup where the requested tool is located, spin the turntable

so that the identified cup is at the front-most part of the robot, and then activate its corresponding linear slide lift mechanism to reach the right height for a human medical professional to grab the tool. Once the tool has been used, the medical professional needs only drop it back into the cup for the mobile robot to bring down the individual elevator and prepare for the next hand-off. The surgical flow would continue this way in which the mobile robot effectively performs the operating-room duties of a surgical technician plus being an interface for monitoring time, flow, inventory, and eventually in further versions, predicting what tools might be needed next via cameras and a dedicated predictive engine. At the end of the procedure, once the surgeon wraps up surgery via voice command, the mobile robot would make its way to the docking station.

[0034] Once the mobile robot has docked, the docking station would initiate the disinfection, cleaning, and sanitation procedure. The collection assembly performs a collection mechanism which, when activated, uses the system of rails and motors to line up the custom-made claw perfectly with the top of the mobile robot. At this point, all of the individual elevators of the mobile robot would extend upward for “cup collection”. Once the surgical tool cup holders have been collected, the rail system would line up with the ultrasonic cleaning module and lower the carriage on the Z-rail to the top level of the encasing. The claw with the surgical tool cups and the custom lid attachment would effectively lock into place and seal for the ultrasonic cleaning procedure to take place. Next, the claw and custom lid attachment would unlock for the collection rail system to take the tools to the mechanical cleaning module. At this module, the claw and lid attachment would also lock into the top of the mechanical cleaner’s encasing to form a seal and allow the mechanical cleaning to take place. Subsequently, the rail system would take the claw with the cups and the lid to the final step of the process, for autoclave sanitation. During this step, the lid attachment with the claw and the already cleaned and disinfected cups and tools would be lowered to lock into place and create a perfect seal for the autoclave to do its steam sanitation. Finally, once all three procedures have been completed, the collection assembly would return to its initial position right on top of the mobile robot, and the individual elevators would elevate the surgical tool cups to a position where they are flush aligned with the top of the cover plate.

[0035] To make the REST system of the present disclosure, the mobile robot and the docking station are assembled separately with design for connection to clean, charge, etc. Specifically, to make the mobile robot, one would attach the plurality of pre-assembled individual swerve modules (e.g., four swerve modules with billet wheels, etc.) to the four corners of the stainless steel base (or at four equally spaced positions of the outer perimeter of the base for a

round base) to form an omnidirectional drivetrain. The charging dock would be connected to one of the sides of the drivetrain. Then attach the aluminum frame to the drivetrain. The screen and info module (with its display, backplate, and camera) is attached to a steel mount that is directly connected to both the aluminum body frame and the stainless steel base. For installing the electronic components—including the power supply, the control system, and the computing device—one would secure each component to the chassis or frame and interconnect these components between each other and to other internal/external components of the REST system via the electrical wiring. Next, the turntable mechanism is separately assembled by building the plurality of linear slide elevator modules (e.g., eight linear slide elevator modules), each inside its respective encasing and attaching the corresponding mount. Once the turntable mechanism has been put together, the full turntable system would be attached to the top portion of the chassis. A set of small roller bearings would also be added to the sides of the circular turntable. Before affixing the housing, one would secure the operation panel, the (one or more) status lights, the plurality of speakers, and the drive sensors (including the front laser module and rear proximity sensor) to their respective openings along the polycarbonate housing. Thereafter, the housing would need to be coupled to the chassis and the electrical components of the housing connected to the main computing device. To finalize the assembly of the mobile robot, one would add the removable cover plate on top of the housing.

[0036] To make the docking station, the stainless steel body frame would be coupled to the stainless steel base frame to form a complete chassis. Next, the charging dock receiver would be attached to and disposed along the front of the base frame. Then the ultrasonic cleaner, the mechanical cleaner, and the autoclave would need to be attached to each of their individual modules on the chassis. In particular, the ultrasonic cleaner is put together by inserting the encasing into its respective opening on the chassis. Once the encasing is put in place, the power supply and drain valve can be connected. Then, the generators, the transducer, the tank, and the stainless steel rack would be secured to the encasing (in that order). The board would be positioned to sit at the back of the encasing between the walls of the ultrasonic cleaner and the mechanical cleaner and the temperature control panel would be secured to the front portion of the encasing. Similarly, the mechanical cleaner is assembled and attached to the chassis. The mechanical cleaner is assembled, for instance, by connecting and securing the drain valve and the power supply to the encasing. Thereafter, the heat element, the spray arm, and the stainless steel rack are coupled and fastened together. Subsequently, the autoclave module is added by securing the pressure chamber,

connecting the drain valve and power supply, and attaching the steam and vacuum generators. From here, the frame for the collection assembly is securely attached to the frame of the docking station. Next, the system of X, Y, and Z rails and motors is connected to the frame of the collection assembly. The custom claw along with the custom lid attachment is firmly attached to the carriage. Finally, the control panel is secured to the steel housing and the housing is subsequently attached to the chassis.

[0037] The REST system of the present disclosure is designed to be used autonomously. While surgeons and other operating room staff may “use” the REST system, the functionality of the mobile robot and the docking station machine are programmatically and mechanically designed for autonomous operation. That being said, the mobile robot can be deployed before the start of surgery by way of a trigger mechanism, such as a physical switch (toggled by a human user), a voice command (activation by a human user), or a pre-programmed schedule. Once triggered to start, the mobile robot would deploy autonomously with or without medical personnel being present in the operating room and park in its designated spot next to the surgical bed. During surgery, medical tools can be requested via voice commands and everything would be visually displayed through a screen. For example, if the surgeon needs a Metzenbaum Scissor, the Surgeon can say: “REST, hand me a Metzenbaum Scissor”. The mobile robot would interpret the voice command and autonomously extend the particular linear slide elevator corresponding to the surgical cup in which the requested tool resides. The slide elevator would be elevated to a certain height that is suitable for a human/surgeon to retrieve the requested tool (the elevation height would normally be approximately the same height throughout the surgery) or to hand the tool over to the surgeon. The requested tool would be displayed on the visual interface, along with a timer and other useful information for the medical personnel present. Also, the surgeon may want to see which tools are available. To do this, they need to verbally ask the robot to display available tools on the screen. A surgeon may say, for example, “REST, which tools are available to do this?” Also, the REST system allows the surgeon to use voice commands to request for/put away tools. Once the mobile robot recognizes the surgeon’s requests, it checks whether the turntable is in the correct rotation (i.e., if the correct tool compartment is extended). If not, the mobile robot detracts the tool compartment with a linear slide, rotates to the correct tool compartment, and then extends the linear slide to elevate the correct tool compartment. Then, the surgeon will be able to retrieve or put away the desired tool. This process repeats throughout the course of the surgery. Once the

surgeon lets the mobile robot know that the surgery is complete, the mobile robot enters the “Cleaning” procedure.

[0038] After the surgery is done, the mobile robot would automatically return to its docking station or could be prompted to do so by a human. Upon a successful command, the robot will move over to the docking station for tools to be retrieved and thereby cleaned, disinfected, and sanitized. The tools and holding cups at the docking station would then go through a rigorous three-step cleaning/sanitation process. The first step involves an ultrasonic cleanse to remove debris followed by the second step for a mechanical cleanse using boiling water to kill germs. During the third step, the autoclave uses steam to kill pathogens. Then, the tools would be loaded back into the mobile robot and sealed off with a custom lid to prevent contamination until the next procedure. Additionally, during the cleaning/sanitation stage, the mobile robot will be connected to a charge station of the docking station and begin to charge its power supply. Also, the claw in the docking station automatically maneuvers to retrieve each of the tool compartment “cups” from the mobile robot. The claw, along with the cups, enters the ultrasonic cleaning machine and seals off with the custom lid attachment. The machine is turned on and the ultrasonic cleaning process is run until it is complete. The claw then moves the cups into the mechanical cleaning machine, and similarly, the process is run until it is complete. Finally, the claw moves the cup into the autoclave machine, where the tools are sterilized. After the autoclaving process is complete, the claw moves the tools back to the mobile robot and the REST system reverts back to the “Deployment” procedure. Specifically, during the “Deployment” procedure, the REST system is on standby as it waits for an upcoming surgery. Once information about the surgery is received, the REST system makes sure the mobile robot is loaded with all the necessary tools and requests for extra tools if needed. Once triggered to activate, the mobile robot autonomously detaches from the docking station and moves to its default position in the operating room (next to the surgical bed). This cycle continues as needed for surgical procedures, followed by cleaning of the tools, deployment/wait stage, triggered activation, move to operating room position, and so on.

[0039] The above-described embodiments of the invention are presented for purposes of illustration and not of limitation. While these embodiments of the invention have been described with reference to numerous specific details, one of ordinary skill in the art will recognize that the invention can be embodied in other specific forms without departing from the spirit of the invention. Thus, one of ordinary skill in the art would understand that the invention is not to be limited by the foregoing illustrative details, but rather is to be defined by the appended claims.

CLAIMS

I claim:

1. A robotic essential surgical technologist (REST) system comprising:
a mobile robot that is configured to quickly and accurately deliver surgical tools to a surgeon in an operating room and carry out a comprehensive range of surgical-related tasks; and
a docking station machine that is configured to carry out post-surgery work when the mobile robot is connected, wherein the post-surgery work comprises (i) tool sanitation work and (ii) mobile robot charging work, wherein the tool sanitation work comprises cleaning, disinfecting, and sterilizing the surgical tools after usage by the surgeon in the operating room, wherein the mobile robot charging work comprises charging a power supply of the mobile robot.

ABSTRACT

A robotic essential surgical technologist (REST) system and associated processes are disclosed. The REST system is configured to handle and manage surgical instruments during surgical procedures in an operating room. The REST system carries out a comprehensive range of surgical-related tasks. Being present in the operating room during surgery, the REST system performs the job of a surgical technologist including, without limitation, preparing surgical tools for a surgical procedure and cleaning the surgical tools after the surgery is completed. In cleaning the surgical tools, the REST system attaches to a bigger machine at the end of the surgery to clean, disinfect, and sterilize the surgical tools. The REST system is designed to improve surgical flow by seamlessly integrating with existing surgical equipment and medical personnel.

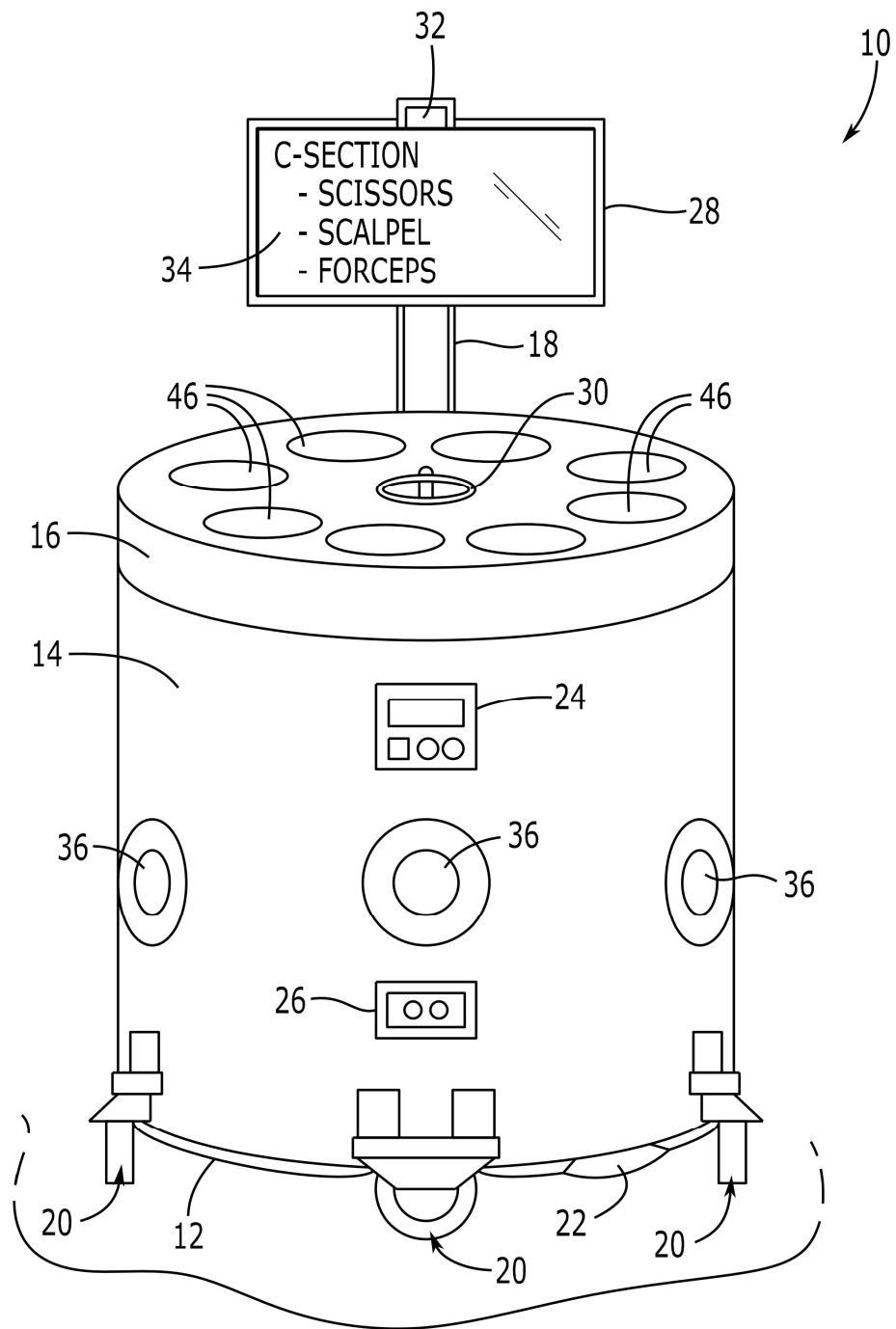


FIG. 1

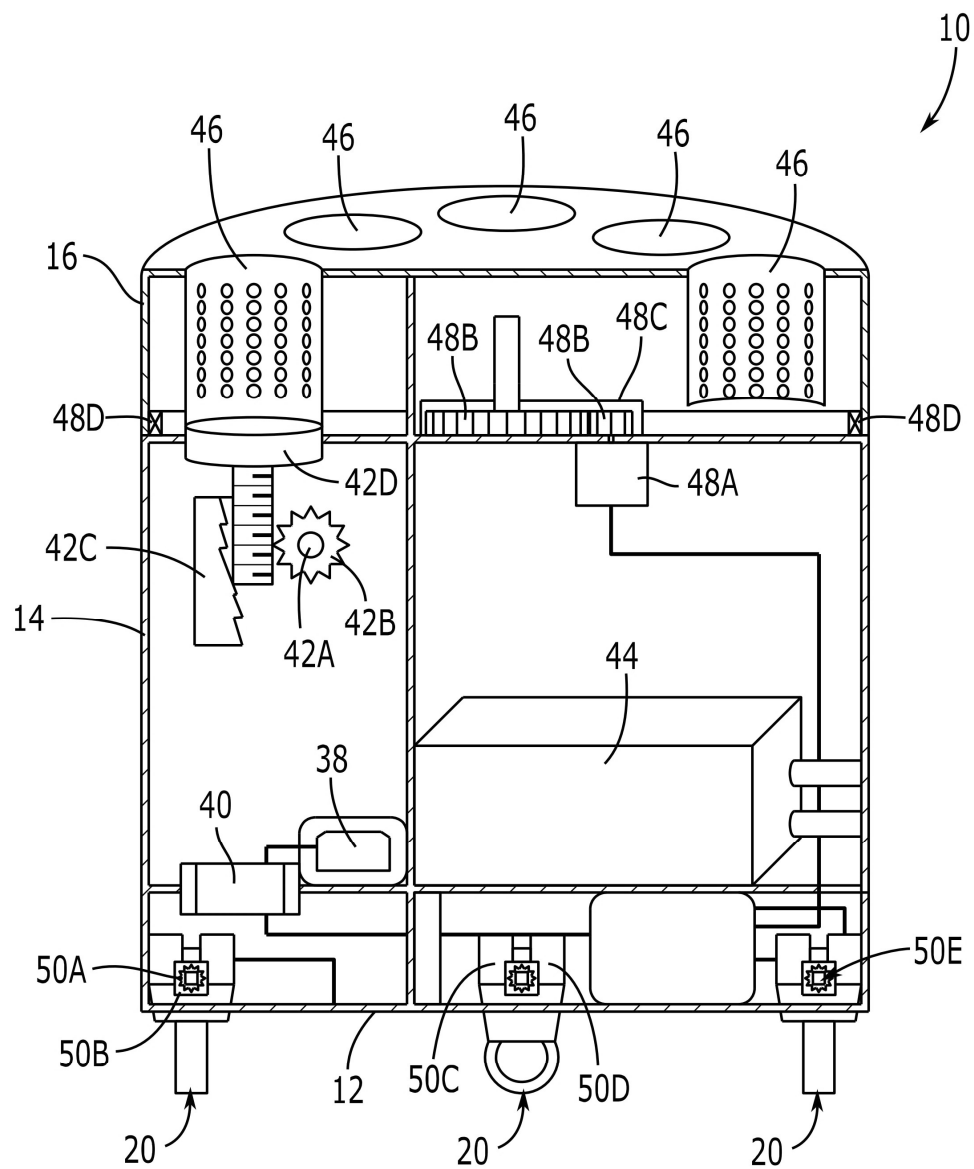


FIG. 2

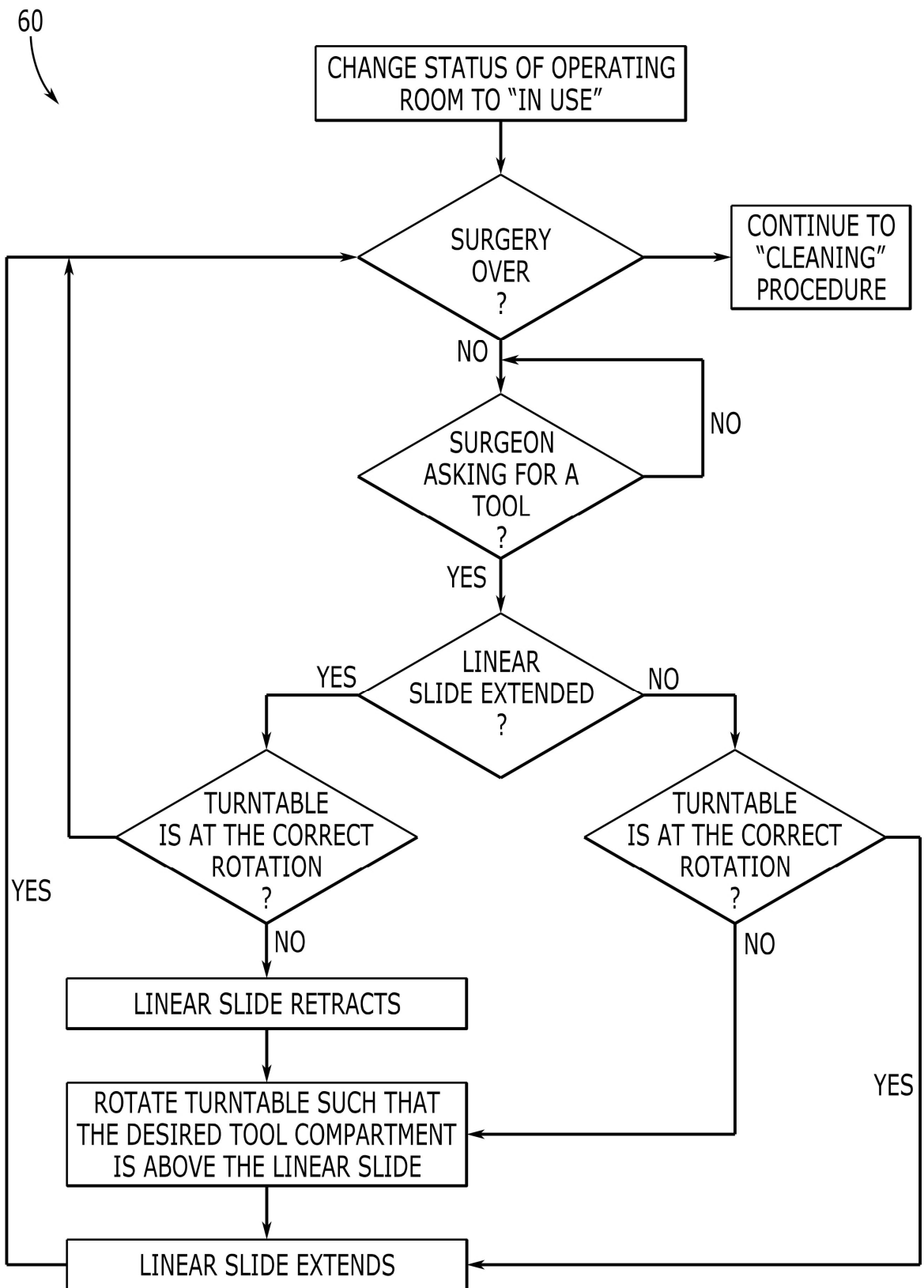


FIG. 3

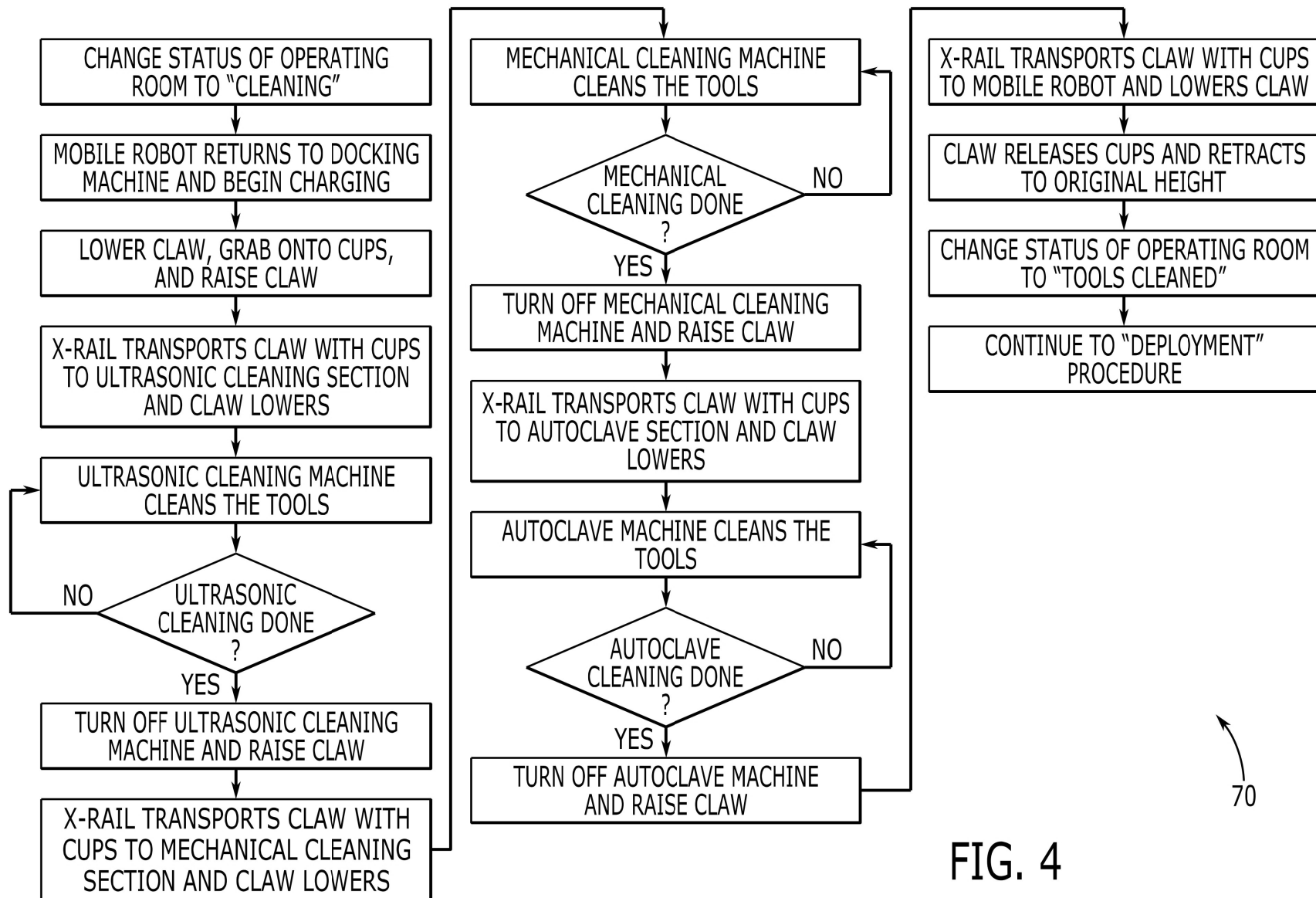


FIG. 4

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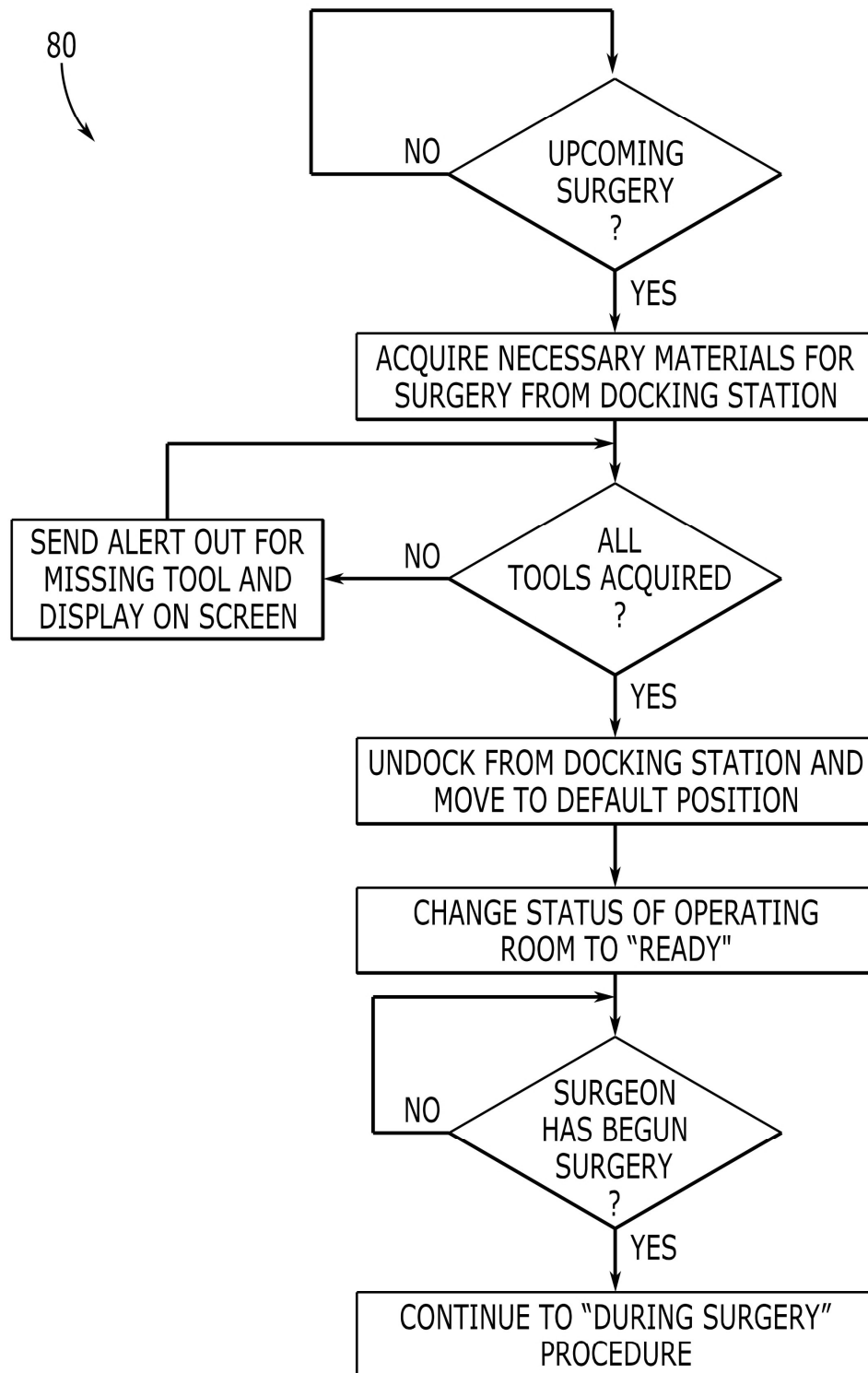


FIG. 5

REST

Robotic Essential Surgical Technologist

DOCKING STATION (DS) FRONT VIEW

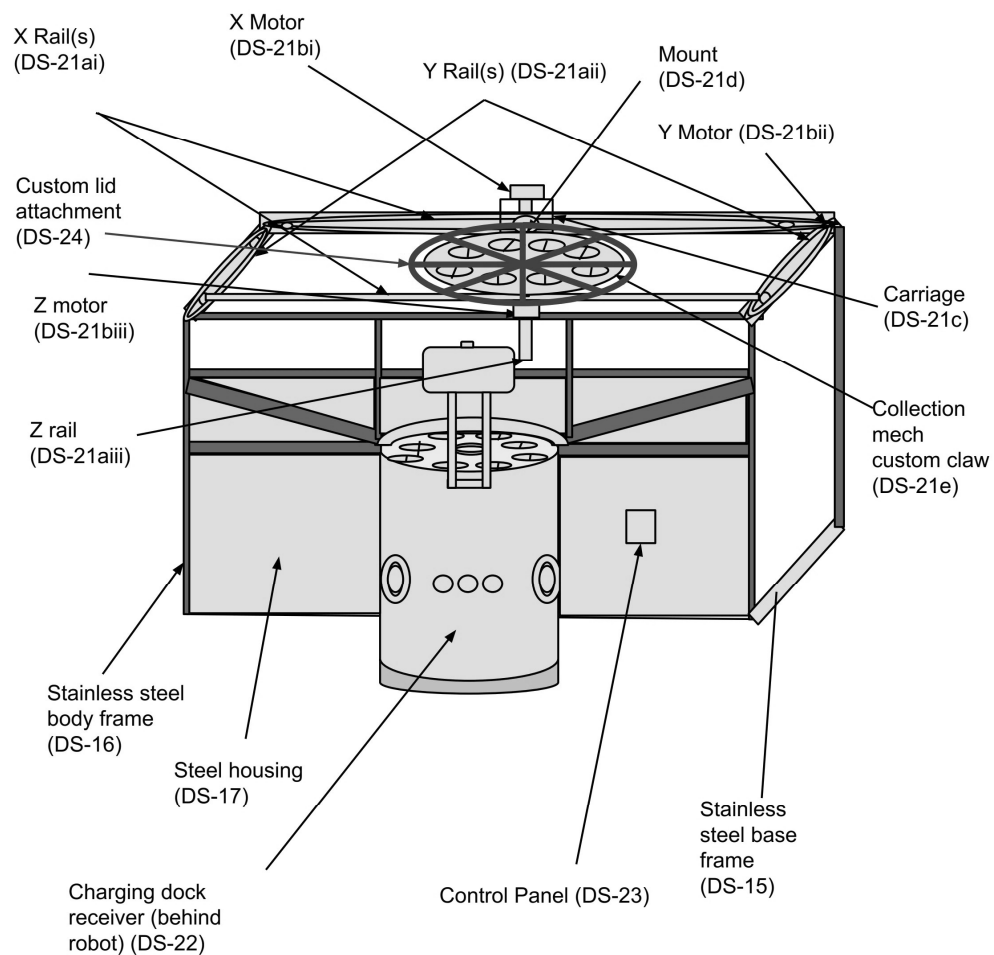


FIG.6

REST

Robotic Essential Surgical Technologist

DOCKING STATION (DS) SECTIONAL VIEW

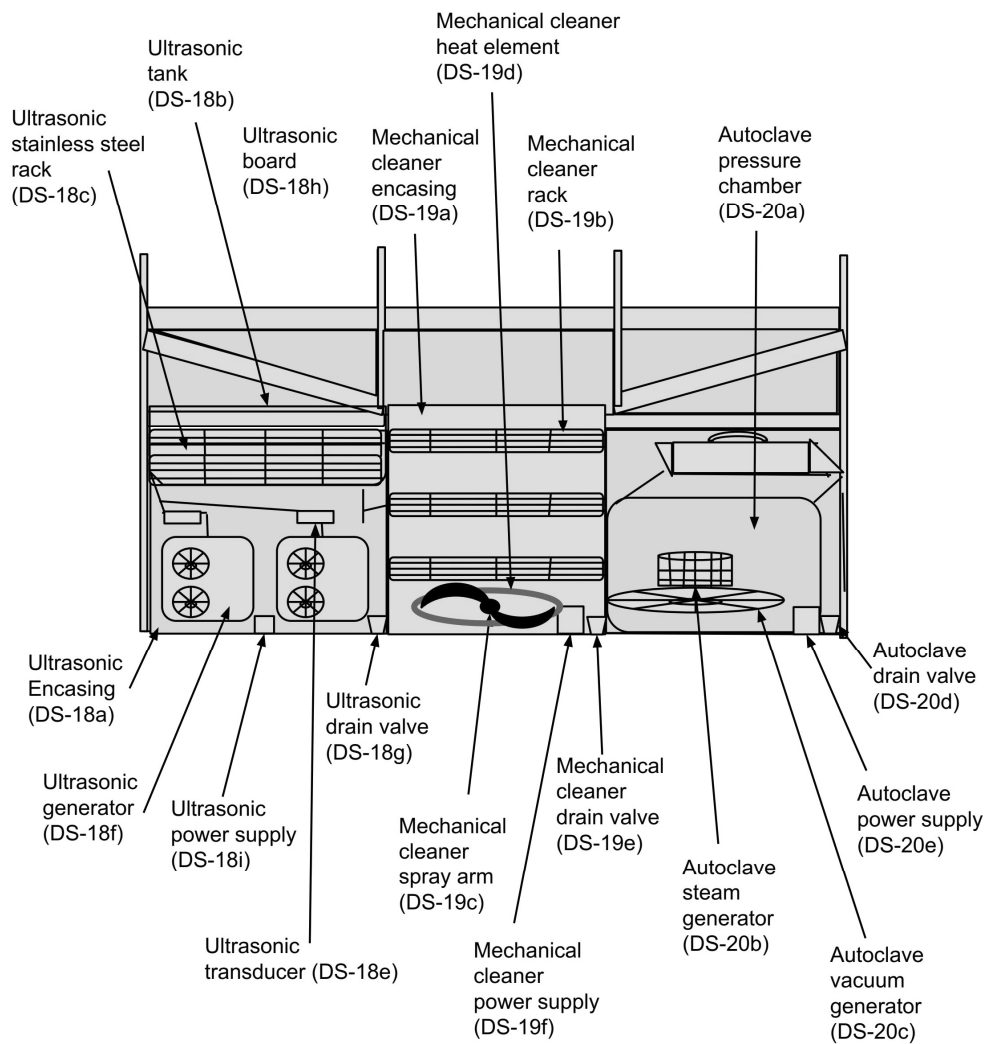


FIG.7

REST

Robotic Essential Surgical Technologist

DOCKING STATION (DS) TOP SECTIONAL VIEW

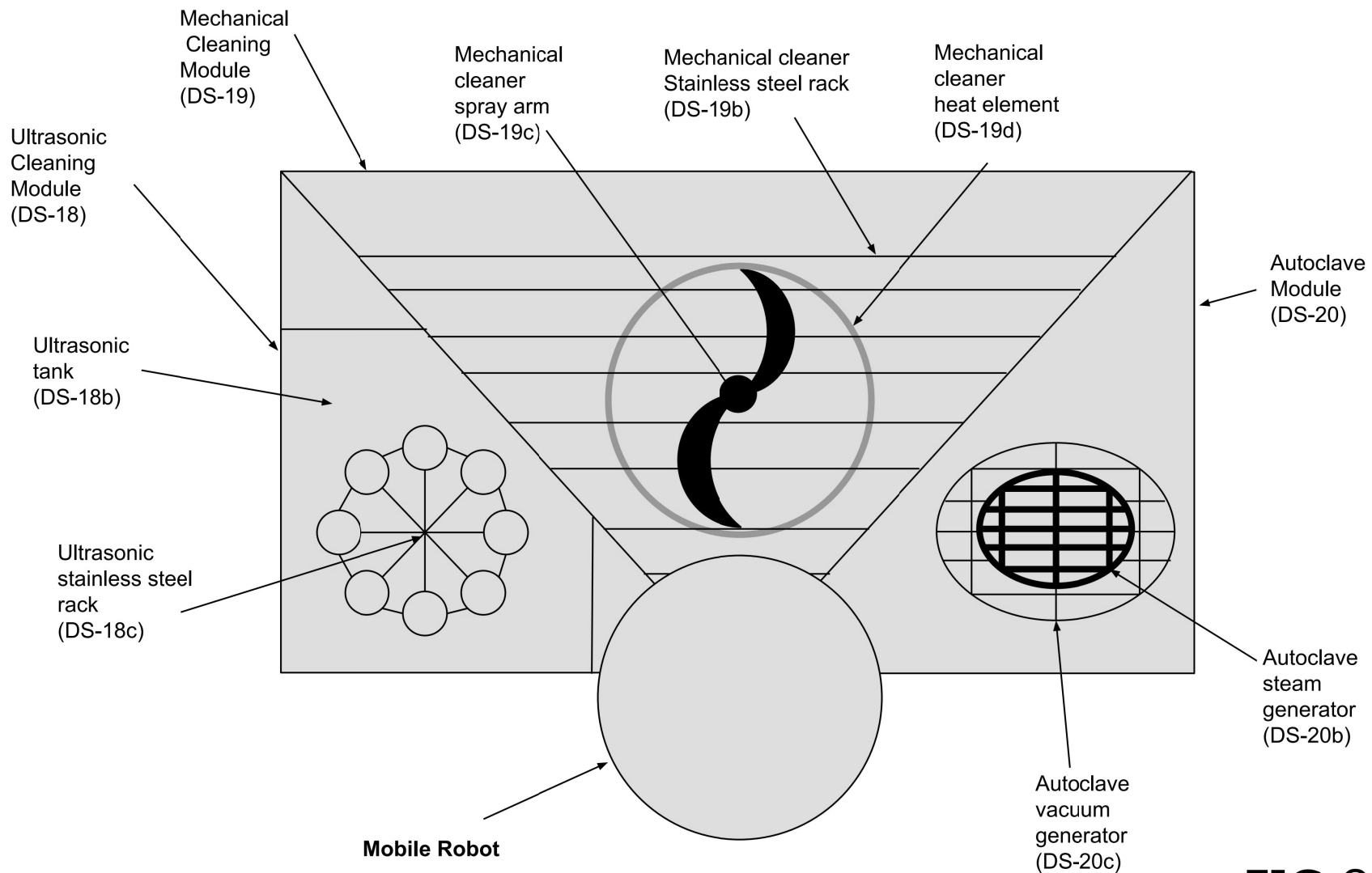


FIG.8

REST

Robotic Essential Surgical Technologist

DOCKING STATION (DS) TOP VIEW

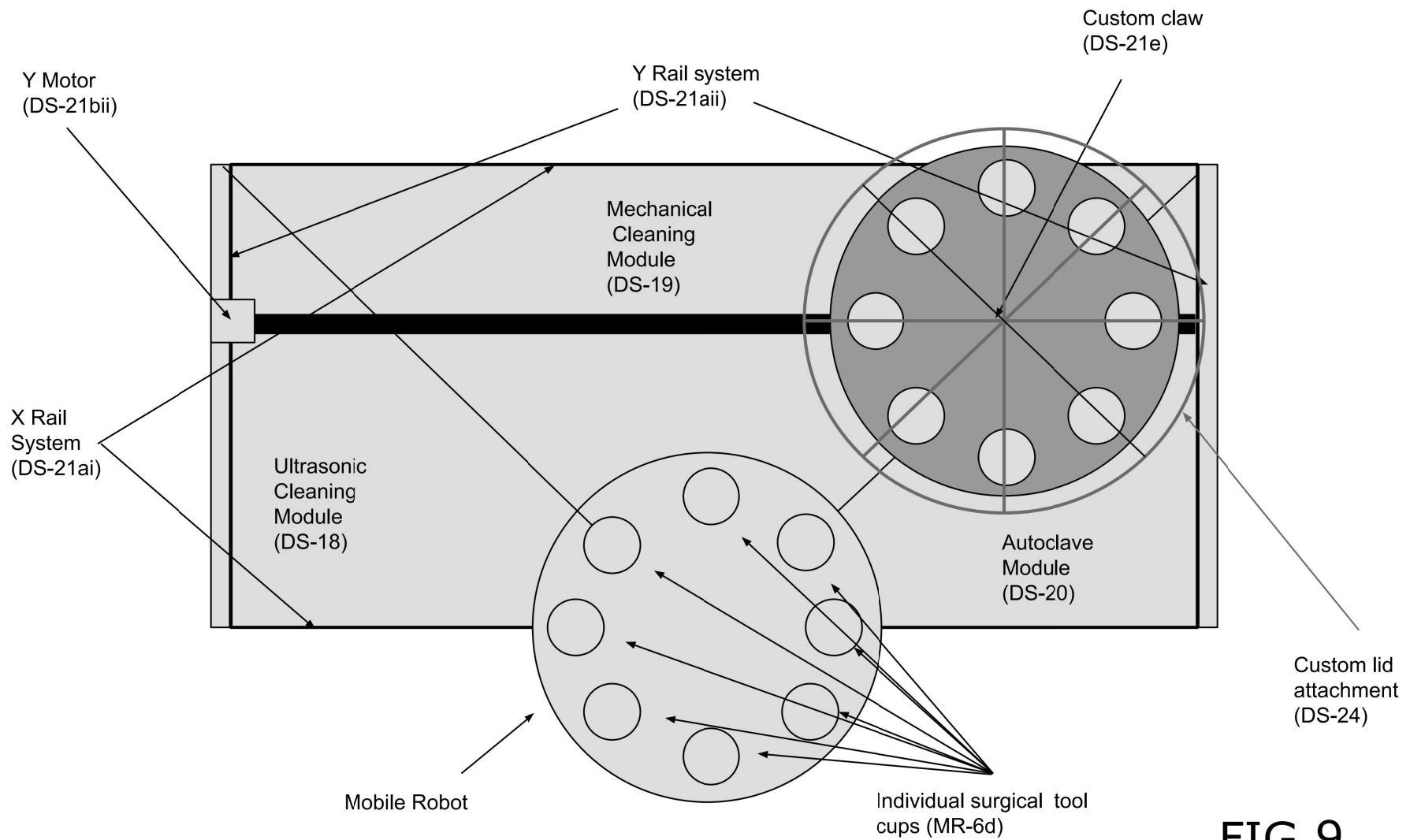


FIG.9

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP
		Application Number	
Title of Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2:

<input type="checkbox"/>	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor 1					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Sasikumar		Allidurai			
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service						
City	Dublin	State/Province	CA	Country of Residence	US	

Mailing Address of Inventor:

Address 1	3203 Madden Way					
Address 2						
City	Dublin	State/Province	CA			
Postal Code	94568	Country	US			

Inventor 2					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Anirudh		Sara			
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service						
City	Dublin	State/Province	CA	Country of Residence	US	

Mailing Address of Inventor:

Address 1	6500 Dublin Blvd.					
Address 2	Unit C					
City	Dublin	State/Province	CA			
Postal Code	94568	Country	US			

Inventor 3					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Iniyan Sasikumar		Sasikumar			
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service						

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP	
		Application Number		
Title of Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES			

City	Dublin	State/Province	CA	Country of Residence	US
-------------	--------	-----------------------	----	-----------------------------	----

Mailing Address of Inventor:

Address 1	6500 Dublin Blvd.				
Address 2	Unit C				
City	Dublin		State/Province	CA	
Postal Code	94568		Country	US	

Inventor 4	Remove
Legal Name	

Prefix	Given Name	Middle Name	Family Name	Suffix	
	Rodrigo		Colin		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Dublin	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	6500 Dublin Blvd.				
Address 2	Unit C				
City	Dublin		State/Province	CA	
Postal Code	94568		Country	US	

Inventor 5	Remove
Legal Name	

Prefix	Given Name	Middle Name	Family Name	Suffix	
	Sean		Chen		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Dublin	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	6500 Dublin Blvd.				
Address 2	Unit C				
City	Dublin		State/Province	CA	
Postal Code	94568		Country	US	

Inventor 6	Remove
Legal Name	

Prefix	Given Name	Middle Name	Family Name	Suffix	
	Rishi		Kesaraju		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Dublin	State/Province	CA	Country of Residence	US

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP
		Application Number	
Title of Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES		

Mailing Address of Inventor:

Address 1	6500 Dublin Blvd.		
Address 2	Unit C		
City	Dublin	State/Province	CA
Postal Code	94568	Country i	US

Inventor 7[Remove](#)**Legal Name**

Prefix	Given Name	Middle Name	Family Name	Suffix	
	Neil		Sarkar		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Dublin	State/Province	CA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	6500 Dublin Blvd.		
Address 2	Unit C		
City	Dublin	State/Province	CA
Postal Code	94568	Country i	US

Inventor 8[Remove](#)**Legal Name**

Prefix	Given Name	Middle Name	Family Name	Suffix	
	Issac		Kim		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Dublin	State/Province	CA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	6500 Dublin Blvd.		
Address 2	Unit C		
City	Dublin	State/Province	CA
Postal Code	94568	Country i	US

Inventor 9[Remove](#)**Legal Name**

Prefix	Given Name	Middle Name	Family Name	Suffix	
	Joshua		Pang		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Dublin	State/Province	CA	Country of Residence i	US

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP
		Application Number	
Title of Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES		

Mailing Address of Inventor:

Address 1		6500 Dublin Blvd.	
Address 2		Unit C	
City	Dublin	State/Province	CA
Postal Code	94568	Country ⁱ	US
Inventor 10		Remove	
Legal Name			
Prefix	Given Name	Middle Name	Family Name
	Mihi		Nagariya
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service			
City	Dublin	State/Province	CA
Country of Residence ⁱ		US	

Mailing Address of Inventor:

Address 1		6500 Dublin Blvd.	
Address 2		Unit C	
City	Dublin	State/Province	CA
Postal Code	94568	Country ⁱ	US
Inventor 11		Remove	
Legal Name			
Prefix	Given Name	Middle Name	Family Name
	Aryan		Gupta
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service			
City	Dublin	State/Province	CA
Country of Residence ⁱ		US	

Mailing Address of Inventor:

Address 1		6500 Dublin Blvd.	
Address 2		Unit C	
City	Dublin	State/Province	CA
Postal Code	94568	Country ⁱ	US
Inventor 12		Remove	
Legal Name			
Prefix	Given Name	Middle Name	Family Name
	Haris		Yunus
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service			
City	Dublin	State/Province	CA
Country of Residence ⁱ		US	

Mailing Address of Inventor:

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP
		Application Number	
Title of Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES		

Address 1		6500 Dublin Blvd.	
Address 2		Unit C	
City	Dublin	State/Province	CA
Postal Code	94568	Country ⁱ	US
Inventor 13			Remove
Legal Name			
Prefix	Given Name	Middle Name	Family Name
	Sinjini		Pal
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service			
City	Dublin	State/Province	CA
Country of Residence		US	

Mailing Address of Inventor:			
Address 1		6500 Dublin Blvd.	
Address 2		Unit C	
City	Dublin	State/Province	CA
Postal Code	94568	Country ⁱ	US
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add			

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence Information of this application.			
Customer Number	22252		
Email Address	LZPATENTS@PLAGERSCHACK.COM	Add Email	Remove Email
Email Address	MARK@PLAGERSCHACK.COM	Add Email	Remove Email

Application Information:

Title of the Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES		
Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP	Small Entity Status Claimed <input type="checkbox"/>	
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	9	Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP
		Application Number	
Title of Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES		

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☒ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	22252		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP
		Application Number	
Title of Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES		

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP
		Application Number	
Title of Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP
		Application Number	
Title of Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.				
Applicant 1				
<p>If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.</p>				
<input type="button" value="Clear"/>				
<input type="radio"/> Assignee		<input type="radio"/> Legal Representative under 35 U.S.C. 117		<input type="radio"/> Joint Inventor
<input type="radio"/> Person to whom the inventor is obligated to assign.			<input type="radio"/> Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:				
Name of the Deceased or Legally Incapacitated Inventor: <input type="text"/>				
If the Applicant is an Organization check here. <input type="checkbox"/>				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Applicant:				
Address 1				
Address 2				
City		State/Province		
Country		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Applicant Data may be generated within this form by selecting the Add button.				

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP
		Application Number	
Title of Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES		

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		State/Province	
Country ⁱ		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Mark H. Plager, Esq./			Date (YYYY-MM-DD)	2023-08-24
First Name	Mark	Last Name	Plager	Registration Number	35648

Additional Signature may be generated within this form by selecting the Add button.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP
		Application Number	
Title of Invention	ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

- 1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
- 2 A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
- 3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
- 4 A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
- 5 A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
- 6 A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
- 7 A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
- 8 A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
- 9 A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)	Attorney Docket Number	ALLIDURAI.SASI-LZ.005PP
	First Named Inventor	Sasikumar Allidurai
	<i>COMPLETE IF KNOWN</i>	
	Application Number	
	Filing Date	
	Art Unit	
<input checked="" type="checkbox"/> Declaration Submitted With Initial Filing	OR	<input type="checkbox"/> Declaration Submitted After Initial Filing (surcharge (37 CFR 1.16(f)) required)
	Examiner Name	

ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST) SYSTEM AND PROCESSES*(Title of the Invention)*

As a below named inventor, I hereby declare that:

This declaration is directed to:

☒ The attached application,

OR

☐ United States Application Number or PCT International application number _____

filed on _____.

The above-identified application was made or authorized to be made by me.

I believe I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Direct all correspondence to:	<input checked="" type="checkbox"/> The address associated with Customer Number:	<div>22252</div>	OR	<input type="checkbox"/> Correspondence address below
Name				
Address				
City		State	Zip	
Country	Telephone		Email	

[Page 1 of 6]

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc ID: 2b95200f1c98b1fe1b75a0f378fd8fa2e5a1d31a

DECLARATION — Utility or Design Patent Application

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LEGAL NAME OF SOLE OR FIRST INVENTOR:

(E.g., Given Name (first and middle if any) and Family Name or Surname)

Sasikumar Allidurai

Inventor's Signature

Date (Optional)

Residence: City

State

Country

Dublin

CA

US

Mailing Address

3203 Madden Way

City

State

Zip

Country

Dublin

CA

94568

US



Additional inventors are being named on the

Supplemental sheet(s) PTO/AIA/10 attached hereto

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Supplemental Sheet (for PTO/AIA/08,09)

Page 3 of 6**Legal Name of Additional Joint Inventor, if any:**

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Sinjini Pal

Inventor's
Signature09 / 07 / 2023
Date (Optional)

Residence: City Dublin

State CA

Country US

Mailing Address
6500 Dublin Blvd. Unit C

City Dublin

State CA

Zip 94568

Country US

Legal Name of Additional Joint Inventor, if any:

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Haris Yunus

Inventor's
Signature

Date (Optional)

Residence: City Dublin

State CA

Country US

Mailing Address
6500 Dublin Blvd. Unit C

City Dublin

State CA

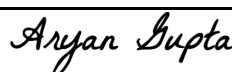
Zip 94568

Country US

Legal Name of Additional Joint Inventor, if any:

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Aryan Gupta

Inventor's
Signature09 / 05 / 2023
Date (Optional)

Residence: City Dublin

State CA

Country US

Mailing Address
6500 Dublin Blvd. Unit C

City Dublin

State CA

Zip 94568

Country US

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Page 4 of 6**Legal Name of Additional Joint Inventor, if any:**

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Mihi Nagariya

Inventor's
Signature*Mihi N*08 / 29 / 2023
Date (Optional)

Residence: City Dublin

State CA

Country US

Mailing Address
6500 Dublin Blvd. Unit C

City Dublin

State CA

Zip 94568

Country US

Legal Name of Additional Joint Inventor, if any:

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Joshua Pang

Inventor's
Signature*Junyeong Pang*09 / 12 / 2023
Date (Optional)

Residence: City Dublin

State CA

Country US

Mailing Address
6500 Dublin Blvd. Unit C

City Dublin

State CA

Zip 94568

Country US

Legal Name of Additional Joint Inventor, if any:

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Issac Kim

Inventor's
Signature

Date (Optional)

Residence: City Dublin

State CA

Country US

Mailing Address
6500 Dublin Blvd. Unit C

City Dublin

State CA

Zip 94568

Country US

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SUPPLEMENTAL SHEET FOR DECLARATION**ADDITIONAL INVENTOR(S)**

Supplemental Sheet (for PTO/AIA/08,09)

Page 5 of 6**Legal Name of Additional Joint Inventor, if any:**

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Sean Chen

Inventor's
Signature

08 / 29 / 2023

Date (Optional)

Residence: City

Dublin

State

CA

Country

US

Mailing Address

6500 Dublin Blvd. Unit C

City

Dublin

State

CA

Zip

94568

Country

US

Legal Name of Additional Joint Inventor, if any:

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Rishi Kesaraju

Inventor's
Signature

08 / 29 / 2023

Date (Optional)

Residence: City

Dublin

State

CA

Country

US

Mailing Address

6500 Dublin Blvd. Unit C

City

Dublin

State

CA

Zip

94568

Country

US

Legal Name of Additional Joint Inventor, if any:

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Neil Sarkar

Inventor's
Signature

Date (Optional)

Residence: City

Dublin

State

CA

Country

US

Mailing Address

6500 Dublin Blvd. Unit C

City

Dublin

State

CA

Zip

94568

Country

US

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SUPPLEMENTAL SHEET FOR DECLARATION**ADDITIONAL INVENTOR(S)**

Supplemental Sheet (for PTO/AIA/08,09)

Page 6 of 6**Legal Name of Additional Joint Inventor, if any:**

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Anirudh Sara

Inventor's
Signature

Date (Optional)

Residence: City Dublin

State CA

Country US

Mailing Address
6500 Dublin Blvd. Unit C

City Dublin

State CA

Zip 94568

Country US

Legal Name of Additional Joint Inventor, if any:

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Iniyan Sasikumar Sasikumar

Inventor's
Signature09 / 13 / 2023
Date (Optional)

Residence: City Dublin

State CA

Country US

Mailing Address
6500 Dublin Blvd. Unit C

City Dublin

State CA

Zip 94568

Country US

Legal Name of Additional Joint Inventor, if any:

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Rodrigo Colin

Inventor's
Signature08 / 25 / 2023
Date (Optional)

Residence: City Dublin

State CA

Country US

Mailing Address
6500 Dublin Blvd. Unit C

City Dublin

State CA

Zip 94568

Country US

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PLAGERSCHACK LLP

16152 Beach Boulevard, Suite 207
Huntington Beach, California 92647
Telephone: (714) 698-0601
Facsimile: (714) 698-0608
www.PLAGERSCHACK.com

August 25, 2023

CONFIDENTIAL
ATTORNEY WORK PRODUCT
ATTORNEY-CLIENT COMMUNICATION

VIA EMAIL: sasi@dublinroboticsclub.com; colinalexcolin@icloud.com;
Iniyansasi@gmail.com; neilsarkar16@gmail.com; isaac.june.kim@gmail.com;
anirudhsara08@gmail.com; sean1688chen@gmail.com; Rishi.kesaraju@gmail.com;
mihinagariya@gmail.com; joshuark05@yahoo.com; pal.sinjini10@gmail.com;
harisyunus72@gmail.com; aryan@gupta-inc.com

Rodrigo Colin
6500 Dublin Blvd. #C
Dublin, CA 94568

Neil Sarkar
6500 Dublin Blvd. #C
Dublin, CA 94568

Issac Kim
6500 Dublin Blvd. #C
Dublin, CA 94568

Aryan Gupta
6500 Dublin Blvd. #C
Dublin, CA 94568

Anirudh Sara
6500 Dublin Blvd. #C
Dublin, CA 94568

Mihi Nagariya
6500 Dublin Blvd. #C
Dublin, CA 94568

Sinjini Pal
6500 Dublin Blvd. #C
Dublin, CA 94568

Iniyas Sasikumar
Sasikumar
6500 Dublin Blvd. #C
Dublin, CA 94568

Sean Chen
6500 Dublin Blvd. #C
Dublin, CA 94568

Joshua Pang
6500 Dublin Blvd. #C
Dublin, CA 94568

Haris Yunus
6500 Dublin Blvd. #C
Dublin, CA 94568

Sasikumar Allidurai
3203 Madden Way
Dublin, CA 94568

Rishi Kesaraju
6500 Dublin Blvd. #C
Dublin, CA 94568

Re: U. S. Provisional Patent Application
Title: ROBOTIC ESSENTIAL SURGICAL TECHNOLOGIST (REST)
SYSTEM AND PROCESSES
Our File No.: SASIKUMAR.ALLIDURAI-LZ.005PP

Dear Sasi, Rodrigo, Rishi, Joshua, Aryan, Anirudh, Neil, Issa, Iniyas, Sean, Mihi, Sinjini and Haris,

This will confirm your understanding regarding this firm's representation of you both in drafting your patent application. There is the potential for a conflict of interest because

August 25, 2023

Page 2

Sasikumar Allidurai is the first named inventor and **Anirudh Sara, Sean Chen, Rishi Kesaraju, Neil Sarkar, Mihi Nagariya, Joshua Pang, Issac Kim, Sinjini Pal, Haris Yunus, Aryan Gupta, Iniyan Sasikumar Sasikumar and Rodrigo Colin** are joint inventors on this provisional application. Further, the ownership of the application and any subsequently filed non-provisional application or issued patent could be complicated by your business relationship. It is our understanding that you have agreed to the ownership of the invention, however this agreement is entirely independent of the legal services we are providing. These conflicting interests, along with your joint request that we represent both of you, create a potential conflict of interest for this firm.

We are required by the California Rules of Professional Conduct, the State Bar Act, and the U.S. Patent and Trademark Office's Code of Ethics to disclose the conflict to you and obtain your waiver of it.

We have agreed to represent you both in this application upon the understanding that both of you agree to waive any potential conflict of interest created by our joint representation. While you presently have an agreement regarding disposition of the patent application, if one of you violates that agreement your interests become adverse, we would have an actual conflict of interest. If an actual conflict of interest between you materializes, we will be obligated to withdraw entirely from this case, and each of you will be required to retain new counsel.

Furthermore, in the event of any litigation between you related to the transaction that is the subject of this letter, we will be prohibited from representing either of you.

With respect to the payment of fees, we have agreed that your fee arrangement will remain unchanged. Once you agree to waive this conflict of interest by signing this letter below, your application will be drafted.

If the terms set forth above are acceptable to you, we ask that you sign below where indicated. Keep one copy for yourself and return the other to this firm.

Respectfully submitted,

PLAGER SCHACK LLP

/Mark H. Plager/

Mark H. Plager, Esq.
For the Firm


MHP/mi

August 25, 2023

Page 3

We hereby acknowledge receipt of the foregoing letter and agree to its terms.

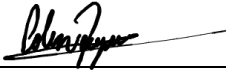
Sasikumar Allidurai



Date

09 / 13 / 2023

Iniyan Sasikumar Sasikumar



Date

08 / 25 / 2023

Rodrigo Colin

Date

Anirudh Sara



Date

08 / 29 / 2023

Sean Chen



Date

08 / 29 / 2023

Rishi Kesaraju

Date

Neil Sarkar



Date

08 / 29 / 2023

Mihi Nagariya



Date

09 / 12 / 2023

Joshua Pang

Date

Issac Kim



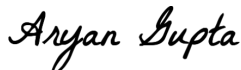
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Sinjini Pal

Date

Haris Yunus



Date

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Aryan Gupta

Date

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Sent for signature to Rodrigo Colin (colinalexcolin@icloud.com), Iniyan Sasikumar Sasikumar (iniyansasik@gmail.com), Neil Sarkar (neilsarkar16@gmail.com), Aryan Gupta (aryan@gupta-inc.com), Sinjini Pal (pal.sinjini10@gmail.com), Joshua Pang (joshuark05@yahoo.com), Mihi Nagariya (mihinagariya@gmail.com), Rishi Kesaraju (rishi.kesaraju@gmail.com) and Sean Chen (sean1688chen@gmail.com) from mishida@plagerschack.com
IP: 47.181.117.178



VIEWED

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Viewed by Rodrigo Colin (colinalexcolin@icloud.com)
IP: 174.160.49.24



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IP: 98.51.134.129

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IP: 108.211.106.82



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Viewed by Mihi Nagariya (mihinagariya@gmail.com)
IP: 174.160.47.41



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Signed by Mihi Nagariya (mihinagariya@gmail.com)
IP: 174.160.47.41



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Signed by Rishi Kesaraju (rishi.kesaraju@gmail.com)
IP: 108.211.106.82



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Viewed by Sean Chen (sean1688chen@gmail.com)
IP: 73.222.87.195

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Signed by Sean Chen (sean1688chen@gmail.com)
IP: 73.222.87.195



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Viewed by Iniyan Sasikumar Sasikumar (iniyansasik@gmail.com)
IP: 174.197.65.200



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19:56:32 UTC-7

Signed by Aryan Gupta (aryan@gupta-inc.com)
IP: 104.28.205.136



09 / 07 / 2023
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Signed by Sinjini Pal (pal.sinjini10@gmail.com)
IP: 98.51.134.129



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Viewed by Joshua Pang (joshuark05@yahoo.com)
IP: 162.229.189.238



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Signed by Joshua Pang (joshuark05@yahoo.com)
IP: 162.229.189.238

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Signed by Iniyan Sasikumar Sasikumar (iniyansasik@gmail.com)
IP: 73.92.52.230



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