Genlantis

FirstResponder® UV-C Robot

Catalog #	Description/Content	Contents
E900FRUR	FirstResponder® UV-C Robot, 120-240V	Robot unit Charging pile Power cable 3-Pin charging cable Apple® iPad Mini® Tablet

Related Products	Catalog #
FirstResponder® Sterilizer, 110V	E4110FRS
FirstResponder® Portable UVC Sterilizer	E600UVCP
SteriZAP® UV-C Room Sterilizer, 110V	E500UVCT

INTRODUCTION

UV-C light is electromagnetic radiation with wavelengths shorter than visible light. UV-C can be separated into various wavelength ranges, with the short-wavelength UV-C considered to be germicidal. Furthermore, and at the specific wavelength range of 260 to 270 nm, UV-C is found to be mutagenic to bacteria, viruses and other microorganisms. Germicidal UV-C kills or inactivates microorganisms by destroying their nucleic acids and disrupting their DNA, leaving them unable to perform vital cellular functions.

The FirstResponder® UV-C Robot harnesses the germicidal power of UV-C light, in particular in the 254 nm wavelength. This unit uses shortwave UV-C lamps that emit ultraviolet light with the major peak output (~90%) band at 253.7 nm. The doped fused quartz glass tubes of the FirstResponder lamps pass the 254 nm radiation (which produces very low ozone levels) but blocks the 185 nm wavelength (which produce higher ozone levels).

The FirstResponder® UV-C Robot is an autonomous sterilization device with great features and easy to use Apple® iPad Mini® Tablet interface. The unit will scan and build a map of as many locations as you need, and once the maps are built, all that is needed is to program and run the robot for efficient sterilization of air and surfaces. For extra safety, the robot will automatically shut down if it detects any movement via its sensitive motion detectors. Once the unit is finished, it will automatically return to its charging pile where it will recharge its internal batteries.

The FirstResponder UV-C Robot is intended for use in disinfection of air and surfaces in laboratories, hospital or clinic rooms, schools, food-processing areas, meeting spaces, conference rooms, or any other trafficked locations like business offices and hallways.

Specifications	
UV-C Lamps	30W per lamp, 240W total (8 lamps); 253.7 nm
CPU	RK3288, quad-core
Memory	2GB RAM; 8GB Flash
Battery	Lithium ion; 40AH, 24V; 8 hours standby time; ≥ 3 hours working time
WiFi	Supports 2.4/5G 802.11 b/g/n
Lidar Sensor	Scanning radius: 25 m (82 feet)
Navigation	Accuracy: ±5 cm (2 inches); travel speed: 0.5 meters/second (1.6 feet/second)
Charger	Input voltage: 120-240 volts AC; output: 25.2V, 10A
Dimensions and Weight	Robot: 132 x 50.8 x 50.8 cm (52 x 20 x 20 inches), 35 kg (77 lbs). Charging pile: 35.6 x 15.3 x 31.75 cm (14 x 6 x 12.5 inches),
Warranty	1 year

SAFETY NOTIFICATION:

UV-C radiation can damage the superficial tissues of the eye, and care must be taken to avoid any exposure to the eyes. Wear eye protection at all time, such as glass or plexiglass eyewear, or face mask in case of accidental exposure to UV-C light. Exposure of unprotected skin to UV-C for extended periods of time may cause skin burn and possible damage to cellular or tissue DNA. In case of robot malfunction, turn the unit off using the emergency stop button, and flip the power switch off (Section 6, Step 2)

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Note and Disclaimer

The FirstResponder® UV-C Robot is not a replacement or substitute for good cleaning practices. Areas to be sterilized must be free of excess contaminants, especially any visible liquids or solids (for example bodily fluids, debris or dirt). The FirstResponder UV-C Robot can eliminate or reduce residual surface contaminants, especially bacterial and fungal, but only if the UV-C light is able to directly impact the contaminated surfaces. ***Any surfaces or items that are covered or are behind curtains, glass panels or plastic sheeting will not be sterilized by the unit.* Genlantis makes no claims and offers no guarantees of any kind that the FirstResponder® UV-C Robot will eliminate or reduce all contaminants and under all possible circumstances. For best results, users should closely follow the recommended instructions below.*

PRECAUTIONS AND WARNINGS

(a) Read all instructions before using the device. Use of this device is only for intended purposes as described in this manual.

(B) DO NOT BLOCK OR TAPE OVER THE MOTION DETECTORS, THIS WILL DEACTIVATE A VERY IMPORTANT SAFETY FEATURE THAT ELIMINATES ACCIDENTAL EXPOSURE TO HARMFUL UV-C LIGHT.

(C) FOR SAFE AND PROPER OPERATIONS, DO NOT TAMPER WITH THE UNIT IN ANY WAY.

(D) DO NOT EXPOSE UNIT TO LIQUIDS OF ANY KIND. KEEP UNIT AWAY FROM OPEN LIQUID CONTAINERS OR POTENTIAL SPILL AREAS.

(e) It is normal for the unit to emit a small amount of ozone gas when operating; briefly aerate the area afterward if needed.

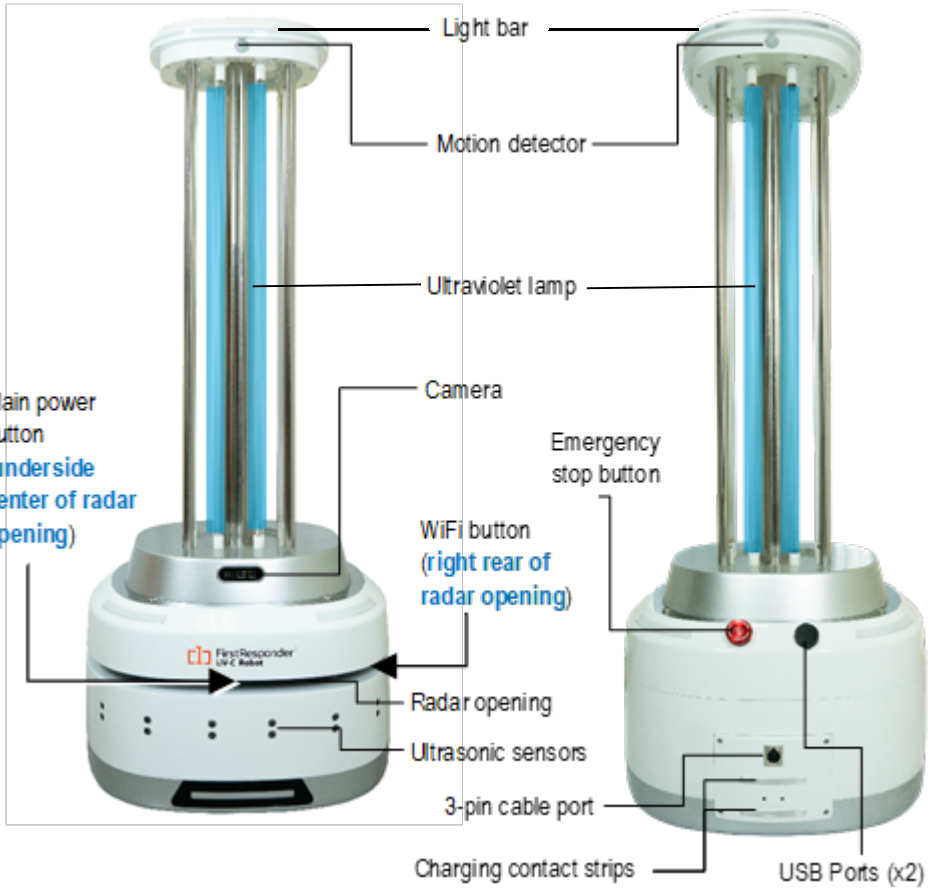
(f) Do not operate if the unit, charging cord, charging pile, or charging plug are damaged or not working properly.

(g) Do not attempt to repair or open the unit unless you are a qualified repair technician.

(h) To avoid injury, handle broken lamps carefully by using protective hand, face, and eye gear. Dispose of broken glass in sharps containers and obey all applicable laws.

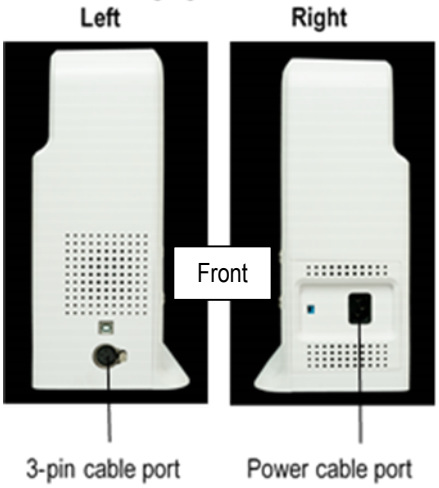
(i) Avoid pushing the unit forcefully.

ROBOT DETAILS



Charging Dock Front

Charging Dock Sides



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ROBOT SETUP

1. After unpacking the items, place the charging pile in a location where you would like the robot to be stationed when charging or not in use.
2. Place the charging pile against a flat wall on a level surface, with enough space around the robot (minimum 1.5 meter or 5 feet of clear semicircular space); plug the charging pile into a power outlet using the power cable.
   NOTE: charging piles cannot be shared by more than one robot.
3. Manually move the robot and park it at the charging pile while making sure that the charging contact strips on both units are touching.
4. A successful charging will show a flashing green light as indicated in the Table 1 below:

Table 1: Charging Pile Indicator Light Status

Charging pile connected to AC source and powered up	Solid red	
Robot connected to charging pile and charging	Flashing green	
Robot fully charged (3-pin charging cable or charging pile)	Solid green	
3-pin charging cable is attached to charging pile	Solid yellow	
3-pin charging cable attached to charging pile and robot	Flashing yellow	
Charging or connection failure	Off color flashing or light off	

5. In cases where the robot cannot or will not park properly at the charging pile, use the 3-pin cable to attach to both the charging pile and robot for a temporary emergency charging procedure.
   NOTE: the 3-pin cable cannot be used while the robot is parked and connected to the charging pile.

SOFTWARE LAUNCH AND CONNECTION

IDM-Robot App Icon

6. The FirstResponder® UV-C Robot kit comes with an Apple®, Inc. iPad Mini® tablet with preloaded "IDM-Robot" App for connecting and communicating with the robot unit. Make sure that the IDM-Robot App is installed on the iPad Mini, and if not, download and install it from Apple's App Store® by using the search string "IDM-Robot". **IMPORTANT**: **Do not launch App at this time.**

Follow these steps to establish a connection between the robot and the iPad Mini:

Step 1: connect iPad Mini to your Wi-Fi network; open **Settings** > **General**, > **Date & Time** > turn on the **Set Automatically** function. Make sure the iPad Mini time is synchronized correctly before proceeding.

Step 2: Power the robot on by flipping the robot main power switch from left to right; the power switch is located in the center and underside of the radar opening as shown in this image: →

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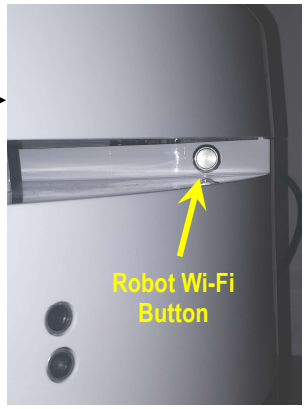
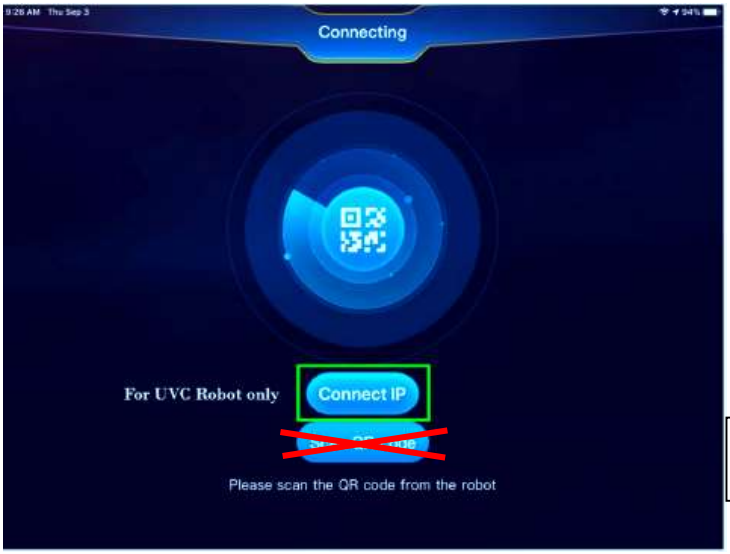
Step 3: Turn the robot communication hub on by pressing the Wi-Fi button located on the right rear of the radar opening as shown in this image: →



Step 4: Return to the iPad Mini® **Settings** menu, and click on **WLAN**. After about 30-60 seconds, select the **SLAMWAR-xxxxxx** network when it appears in the Wi-Fi list.

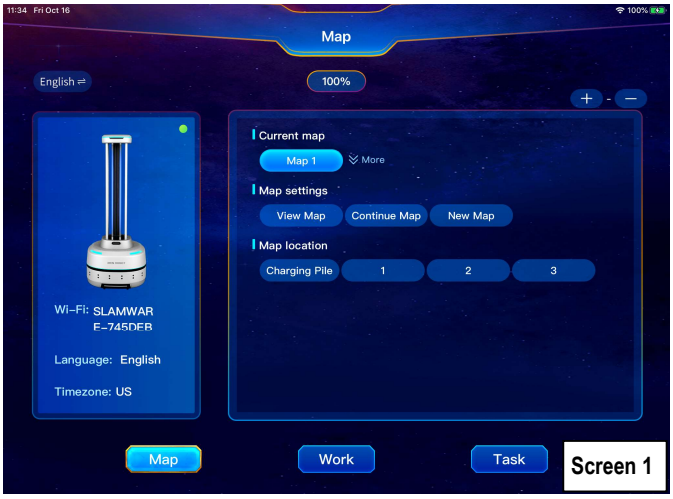
Step 5: Click the iPad Mini home button then launch the IDM-Robot App. The following screen will appear:



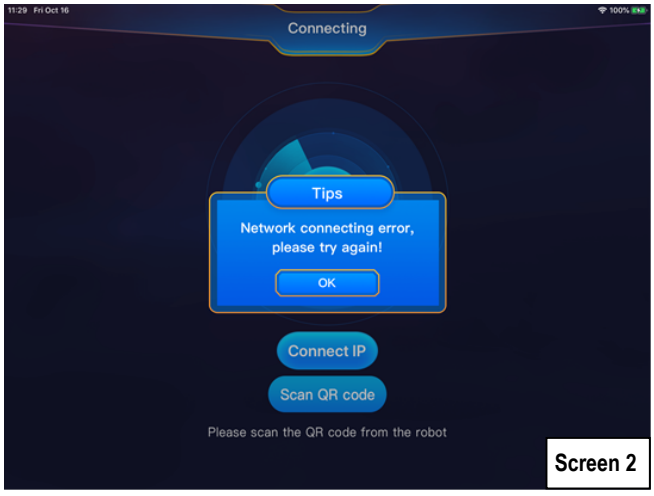
NOTE: Do not use the "Scan QR Code" button with your FirstResponder® UV-C Robot.

Step 6: Click on the "**Connect IP**" button. After successful connection, screen 1 will appear.

In some cases, a connection is unsuccessful and Screen 2 will appear; if so, close the App by double clicking the iPad Mini home button and swiping the App up to clear it; relaunch App and try Connect IP again. This step may need to be repeated twice to work properly.



Screen 1



Screen 2

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MANIPULATING AND PROGRAMMING THE ROBOT

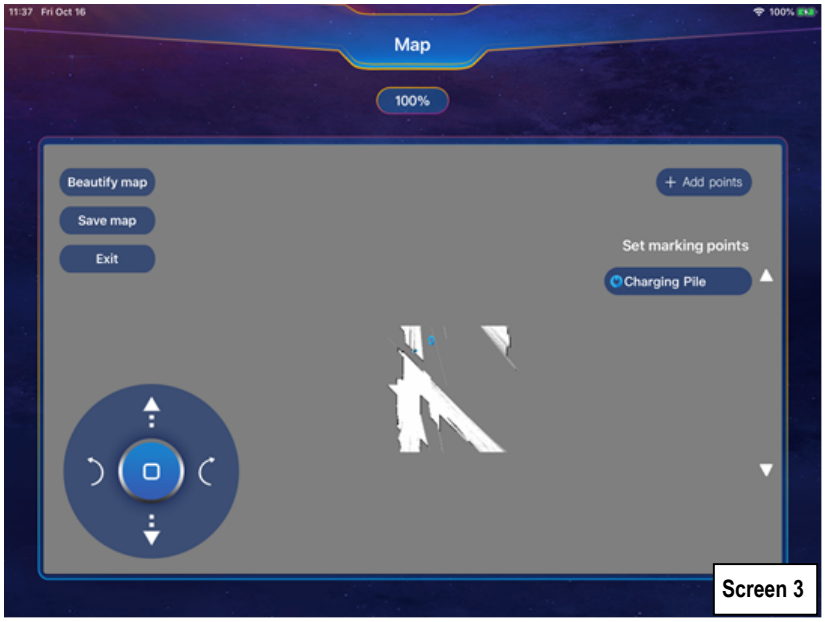
After successful connection between the iPad Mini® and the robot, users are now ready to manipulate and program the robot. It is recommended to follow these steps for proper setup:

Step 7: After tapping on the "**New Map**" button on Screen 1, Screen 3 will appear:

Familiarize yourself with robot controls by using the navigation circle to move robot in all directions. Practice until you are satisfied you have good control of robot movements before proceeding to the next step.

NOTES: the forward and reverse buttons need continuous pressing to keep robot moving; conversely, the left and right rotation buttons will work continuously once tapped, and rotation can be stopped by tapping any of the other areas within the navigation circle.

Step 8: It is important to return the robot to the charging pile - by navigating manually or by tapping the "**Charging Pile**" button – before going to the next step.



Screen 3

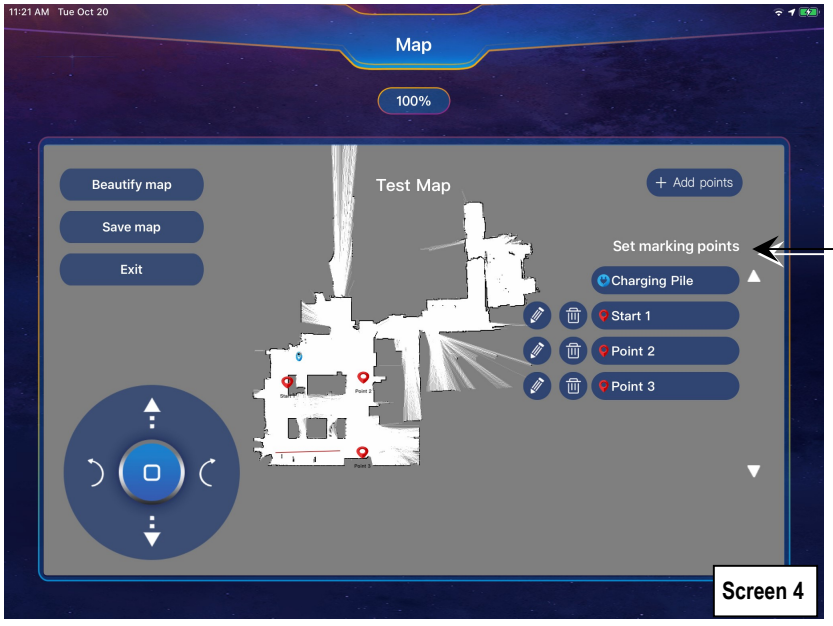
Step 9: Now you are ready to create your first map. Manually move the robot to the first operating point; tap on the "**Add points**" button, and name the first point on the prompt screen. The first point will now appear under the "Set marking points" list (Screen 4)

Move the robot to the next point where the robot should stop and perform a sterilization cycle. Tap the "**Add points**" button and name your second point. Repeat this step as many times as necessary to cover all of the points that your robot should cover during a sterilization cycle within a space.

Step 10: Once finished with adding map points, your screen should look like Screen 4, where the map will list the programmed points and show them as red place markers on the map.

Step 11: In some instances, there will be some special objects along the robot route, such as glass walls, staircases, elevators, and protruding table/chair legs to name a few examples. In such cases, it is recommended to create a virtual wall to prevent the robot from running into or past these obstacles. To do so, follow these steps:

Step 11a: Tap on "**Beautify map**" button.



Screen 4

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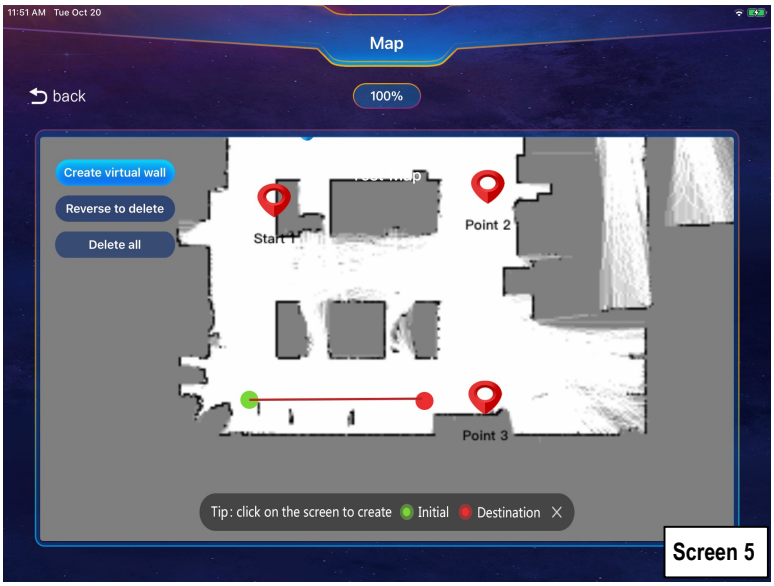
Step 11b: On next screen, pinch out to zoom in and enlarge map (Screen 5). Tap on the "**Create virtual wall**" button. Tap on first spot where virtual wall starts (a green dot will appear), then tap on the second spot where virtual wall ends (a red dot will appear) and a red line is automatically drawn to show virtual wall location.

The virtual wall can be deleted and redone as many times as needed by tapping on the "**Reverse to delete**" button and then repeating Step 11b.



Screen 5

Step 12: Once satisfied with the map creation process, tap the "**Work**" button on the bottom of the screen. Screen 6 will appear and will show the space map along with the charging pile location (blue marker), the programmed points (red markers), and any virtual wall locations.

CAUTION: in this manual operation mode, the motion detectors safety mechanism is turned off; users must make sure to wear protective glasses and clothing to avoid accidental damage to eyes and skin.

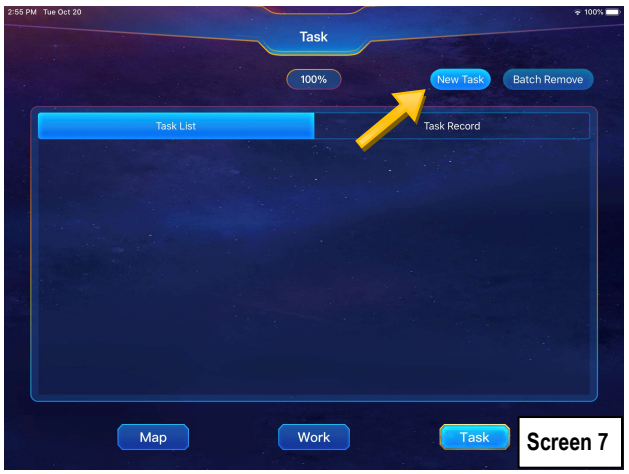
Screen 6

While in Screen 6, the robot can be manually navigated to each of the set points. In the Screen 6 example, tapping on the "Start 1" button will navigate the robot to that location; once at the Start 1 position, a brief message that the robot has arrived at location will flash on the screen;

If needed, tap on the "**Start**" button to manually turn on the UV lamps, then immediately tap the "**End**" button to turn the UV lamps off. When doing this test, it is highly recommended to minimize exposure the UV-C light by standing as far away from the robot as possible.

Tap on "**Charging pile**" button to return the robot to the start point.

Step 13: To program sterilization tasks, tap on the "**Task**" button on bottom of Screen 6, then tap on the "**New Task**" button on top left of Screen 7.



Screen 7

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Step 14: To program task parameters, tap on each of the fields to modify. Start by giving the task a name, then select task type as either Normal Task (manual operation) or Timed Task (operation will start at a selected date and time).

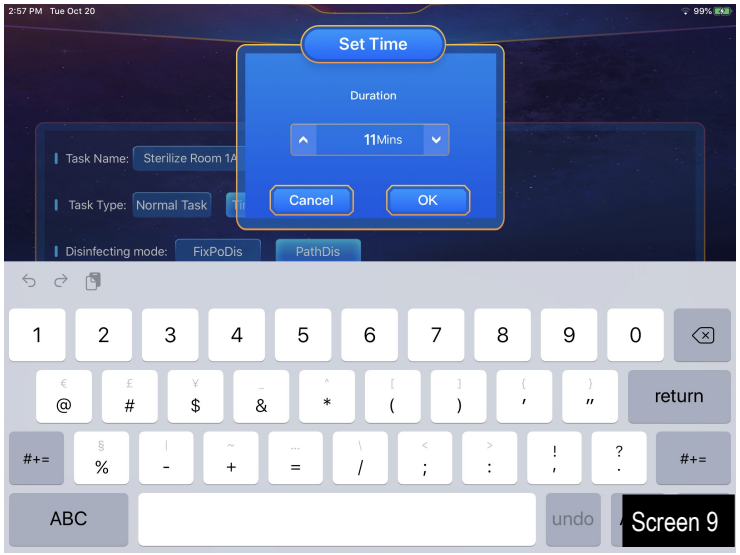
If Timed Task is needed, follow the prompts to program the time and date when the robot can begin its sterilization task.

For Disinfecting mode, tap the "**FixPoDis**" button for fixed point disinfection; tap the "**PathDis**" button for pathway disinfection. The difference between the two modes is that the UV lamps will stay on during robot movement between points in the PathDis mode, while the UV lamps will turn off between points in the FixPoDis mode.

Screen 8

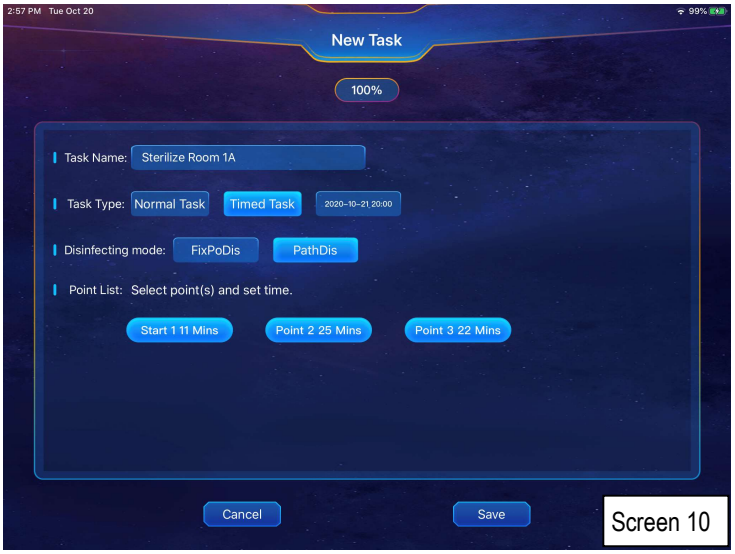
Last steps involve setting the amount of time the robot will stop at each of the selected points. Tap the first point, and set the time duration by using the up and down arrows in the time window, or by typing the time on the screen keyboard (Screen 9)

For guidance on the amounts of times needed at each point based on the type of suspected contaminants, consult with Table 2 on Page 9 of this manual.



Screen 9

Once finished with setting the new task parameters, the screen should look like Screen 10.



Screen 10

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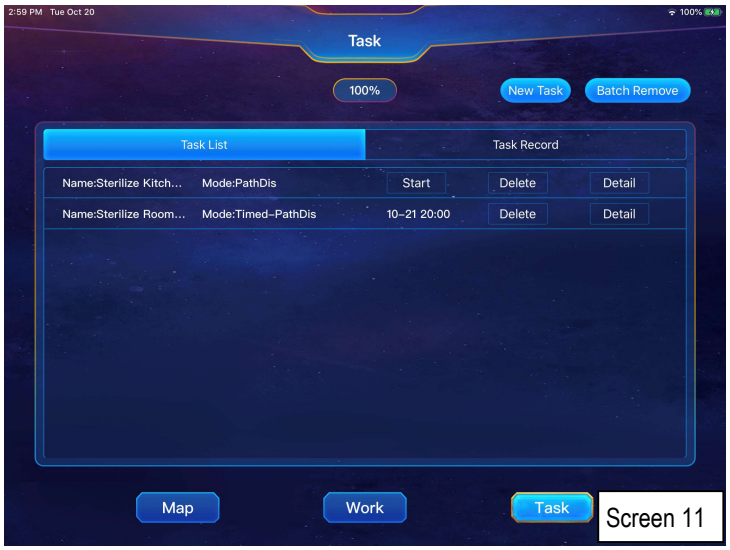
RUNNING STERILIZATION CYCLES

Once all of the tasks are programmed (for different areas and/or time periods) the task list screen will list all of the programmed tasks and will look like Screen 11. You can start any of the tasks by clicking on the "**Start**" button (for Normal Tasks), or by leaving the robot to start automatically (for Timed Tasks).

In either Normal or Timed Tasks, the robot will automatically return to the charging pile where it will dock and charge its batteries once finished with the sterilization task.



Screen 11

IMPORTANT NOTE ABOUT MOTION DETECTION

The FirstResponder® UV-C Robot is equipped with highly sensitive passive infrared (PIR) sensors for motion detection (see Robot Details Section on Page 2). **During normal or timed tasks**, when the PIR sensors detect motion, they will deactivate the robot's UV-C lights; this is safety function to avoid accidental human or animal exposure to UV-C rays. The Robot will resume normal function when it no longer detects movement.

CAUTION: The PIR motion sensors will only work when running Normal or Timed tasks (Task Mode). When practicing with the robot or while in manual (Work) mode, it is possible to turn the UV-C lamps on manually. The motion detectors will not deactivate the UV-C lamps even in the presence of a person or animal in the room in the manual (Work) operation mode. The robot's motion detectors will help minimize, but not completely eliminate accidental exposure to the UV-C rays, so users must use proper precautions while manually testing the UV-C lamps during the setup stages, clearly mark the areas that are being disinfected by posting easy to read signs, and by notifying other people to stay away from the vicinity of the areas being sterilized. Also, always wear protective UV-C goggles and clothing when using the robot in all modes of operation.

EMERGENCY STOP BUTTON

At any time during the robot's sterilization operations, and in case of emergency or unavailability of the iPad Mini tablet, the robot can be stopped by pressing the red emergency stop button on the back side of the unit. When in the emergency stop mode, the robot can be moved manually to any location or back to the charging pile.

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UV-C BULB REPLACEMENT

1. **IMPORTANT**: mark the bulb to be replaced with a piece of tape before moving to the next steps, then unplug the robot from power source and turn the unit off.
2. Access top of robot by removing the 8 underside screws that secure the top lid in place (Figure 1) using a #1 Phillips screwdriver.
3. Once the top lid is off, remove the 4 screws that hold the spring-loaded white cylinder in place (Figure 2) using a #1 Phillips screwdriver.

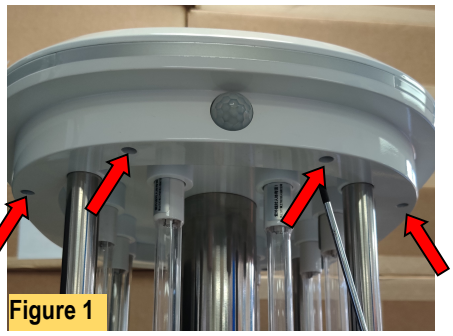
Figure 1

4. Pull the spring-loaded cylinder out (Figure 3), then slide the UV-C bulb up and out of the robot (Figure 4).
5. Insert replacement bulb and make sure the bulb's 4 pins align properly with the 4 holes in the bottom of the robot (Figure 5).
6. Insert all screws back in to secure UV-C bulb and robot top lid.

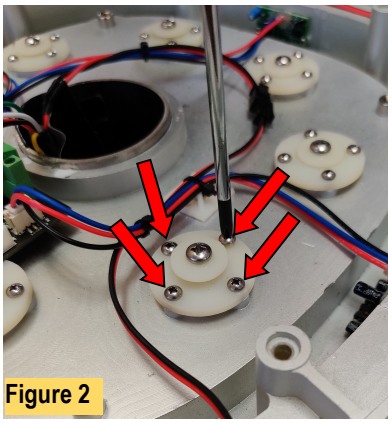
Figure 2

7. Power the robot up and test that the new bulb is working properly; if not, contact Genlantis customer service for troubleshooting and service.

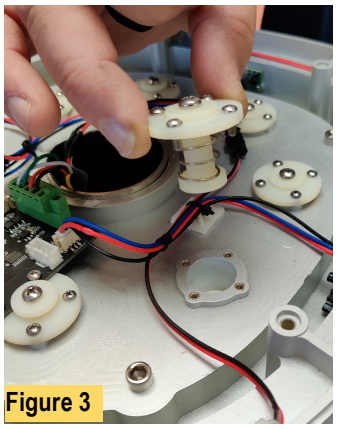
Figure 3

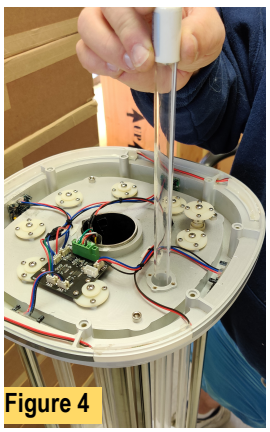
Figure 4


Figure 5

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Table 2: UV-C dosage and FirstResponder Portable UV-C Sterilizer Kill Times

Organism	Ultraviolet radiation (dose) in µWs/cm² needed for kill factor:		FirstResponder UV-C Robot
Bacteria	90% (1 log reduction)	99% (2 log reduction)	**99% Kill Times (in seconds) @ 3 Feet**
Bacillus anthracis – Anthrax	4,520	8,700	16
Bacillus anthracis spores - Anthrax spores	24,320	46,200	84
Bacillus magaterium sp. (spores)	2,730	5,200	9
Bacillus magaterium sp. (veg.)	1,300	2,500	5
Bacillus paratyphusus	3,200	6,100	11
Bacillus subtilis spores	11,600	22,000	40
Bacillus subtilis	5,800	11,000	20
Clostridium tetani	13,000	22,000	40
Corynebacterium diphtheriae	3,370	6,510	12
Ebertelia typhosa	2,140	4,100	7
Escherichia coli	3,000	6,600	12
Leptospiracanicola - infectious Jaundice	3,150	6,000	11
Micrococcus candidus	6,050	12,300	22
Micrococcus sphaeroides	1,000	15,400	28
Mycobacterium tuberculosis	6,200	10,000	18
Neisseria catarrhalis	4,400	8,500	15
Phytomonas tumefaciens	4,400	8,000	15
Proteus vulgaris	3,000	6,600	12
Pseudomonas aeruginosa	5,500	10,500	19
Pseudomonas fluorescens	3,500	6,600	12
Salmonella enteritidis	4,000	7,600	14
Salmonela paratyphi - Enteric fever	3,200	6,100	11
Salmonella typhosa - Typhoid fever	2,150	4,100	7
Salmonella typhimurium	8,000	15,200	28
Sarcina lutea	19,700	26,400	48
Serratia marcescens	2,420	6,160	11
Shigella dyseteriae - Dysentery	2,200	4,200	8
Shigella flexneri - Dysentery	1,700	3,400	6
Shigella paradysenteriae	1,680	3,400	6
Spirillum rubrum	4,400	6,160	11
Staphylococcus albus	1,840	5,720	10
Staphylococcus aureus MRSA	2,600	6,600	12
Staphylococcus hemolyticus	2,160	5,500	10
Staphylococcus lactis	6,150	8,800	16
Streptococcus viridans	2,000	3,800	7
Vibrio comma - Cholera	3,375	6,500	12
Molds	90% (1 log reduction)	99% (2 log reduction)	**99% Kill Times (in seconds) @ 3 Feet**
Aspergillius flavus	60,000	99,000	180
Aspergillius glaucus	44,000	88,000	160
Aspergillius niger	132,000	330,000	600
Mucor racemosus A	17,000	35,200	64
Mucor racemosus B	17,000	35,200	64
Oospora lactis	5,000	11,000	20
Penicillium expansum	13,000	22,000	40
Penicillium roqueforti	13,000	26,400	48
Penicillium digitatum	44,000	88,000	160
Rhisopus nigricans	111,000	220,000	400
Protozoa	90% (1 log reduction)	99% (2 log reduction)	**99% Kill Times (in seconds) @ 3 Feet**
Chlorella Vulgaris	13,000	22,000	40
Nematode Eggs	45,000	92,000	167
Paramecium	11,000	20,000	36
Virus	90% (1 log reduction)	99% (2 log reduction)	**99% Kill Times (in seconds) @ 3 Feet**
SARS-CoV	16,064	24096	44
MERS-CoV	NA	833	2
Bacteriophage - E. Coli	2,600	6,600	12
Infectious Hepatitis	5,800	8,000	15
Influenza	3,400	6,600	12
Poliovirus - Poliomyelitis	3,150	6,600	12
Tobacco mosaic	240,000	440,000	800
Yeast	90% (1 log reduction)	99% (2 log reduction)	**99% Kill Times (in seconds) @ 3 Feet**
Brewers yeast	3,300	6,600	12
Common yeast cake	6,000	13,200	24
Saccharomyces cerevisiae	6,000	13,200	24
Saccharomyces ellipsoideus	6,000	13,200	24
Saccharomyces spores	8,000	17,600	32

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