The UVD Robot doing its job in a high-touch area; the cruise ship gym. The robot can be pre-installed to focus intensively on certain areas of contamination concern. All without human intervention and with robotic precision.

Protect Your Cruise Ship With a COVID-19 Killing Robot

Business-as-usual is hardly a phrase that springs to mind when discussing the future of the cruise industry. An economically sound, multi-leveled infection prevention concept has become the new norm for regaining passenger trust and cruise ship profitability.

The COVID-19 pandemic has highlighted the need for changes in our approach to keep passengers safe. The all too familiar conventional methods such as chemical cleaning, personal protection and social distancing are no longer considered sufficient.

It is becoming clear that for the future cruise ship, additional hospital grade disinfection methods need to be put in place to provide the highest levels of hygiene possible, to protect guests and crew from potential outbreaks. Cruise and ferry operators have no alternative but to prioritize revisioning outdated sanitation protocols to optimize safety and infection prevention.

Implementation of a tried and tested hygiene protocol involving a multi-barrier prevention strategy is desperately needed. A wide array of possible measures are already considered by cruise companies; from enhanced manual cleaning, chemical spraying, to the use of UV-C light.

UV-C is becoming more interesting and rightly so. The 'germicidal' characteristics of UV-C are well known to the healthcare industry. The sun radiates ultraviolet light (UV) in different wavelengths onto the earth. We know this and protect ourselves using sunscreen against UV-A and UV-B, however, the low range UV-C cannot penetrate the earth's atmosphere. Unexposed to UV-C, microorganisms have not developed a natural resistance to light in this spectrum.

Science has proven that microorganisms have no defense to UV-C light, because UV-C mutates their DNA, preventing multiplication. A microorganism that cannot multiply, cannot infect.

Therefore, if you create UV-C light artificially, you have a powerful weapon against 'germs.' Deploy this technology with an intelligent robot, and you maximize the advantages of UV-C while at the same time, address the limitations explained later.

Introducing the World's First, Fully Autonomous, UV-C Disinfection Robot

In partnership with the Danish company UVD Robots, Green Instruments is pleased to introduce the world's first intelligent and fully self-driving UV-C disinfecting robot to the cruise ship industry. Currently deployed at hospitals around the world, protecting patients and healthcare workers from COVID-19, this robot will provide support to your efforts in fighting the risk of an outbreak. As a cost-effective alternative to adding more manual labor, this robot is autonomous and performs an efficient UV-C disinfection process of any area on demand.

◀ **Crew cabins lit up by the UVD Robot. In a matter of minutes, the robot can eliminate all microorganisms, including COVID-19, and provide a safe environment for the crew onboard. The procedure can be applied in all quarters.**

The UVD Robot emits UV-C light at 360 degrees, making it capable of decontaminating both air and surfaces from the floor to the ceiling. As the only device clinically proven to disinfect while on the move, it covers large areas in the shortest of times.

Focus areas for UV-C disinfection onboard varies from ship to ship. During installation Green Instruments will map out high risk areas, breaking them down into easy-to-handle disinfection zones. Once installation is done the ship's crew can easily integrate the UVD Robot into the daily cleaning routine by selecting the pre-installed areas via the user interface. The robot will find its way from its current position to the disinfection destination. In transit, the robot uses advanced obstacle detection sensors to avoid anything in its path. It will re-plan a route if there is no logical way through. The area designated for disinfection is then temporarily closed off, the safety system activated, and the operator begins the preprogrammed cycle at the push of a button. Minutes later, a high level of disinfection of all surfaces and air is finished. The operator can send the robot to the next task or back to its charging station.

In essence, no prior knowledge of robotics or infection prevention procedures is required, and after installation, a duo of one operator and one robot can cover large areas in only a few minutes. A process which can be both validated and documented.

Scientifically Proven to Deal With 'Superbugs'

The use of UV-C to combat resilient microorganisms is scientifically proven and endorsed as an effective measure of decontamination by the CDC and WHO. As the decontamination process uses light, organisms both on surfaces and in the air are inactivated.

The UVD Robot was originally designed to deal with much more resistant and hardy superbugs than COVID-19 and as a result, the robot has been put through a grueling number of independent laboratory tests and local, country specific and medical microbiology validations at various hospitals. In fact, COVID-19 has proven especially easy to inactivate with UV-C light, and cell numbers in highly contaminated areas are quickly reduced by 99.9 percent, simply by the robot driving by.

Fast and Effective with Minimal Inconvenience

If an area is not exposed, it will not be disinfected. Thus, shadow has been a challenge to so-called mobile UV devices. Distance is yet another weakness of these UV solutions. The inverse square law dictates loss of intensity over distance; if you have 100 percent intensity at two meters, you will have 25 percent efficiency at four meters. The UVD Robot diminishes these limitations by its ability to move around shadowing objects and closer to high touch surfaces. Minimizing both the disinfection cycle duration and exposure needed.

While the UVD Robot can be assigned to disinfect all desired areas, it is unrivalled in effective decontamination of large areas. Proven efficiency in areas of 500 square meters in less than 30 minutes – this combination of speed and efficiency translates into minimal disturbances for passengers. Typical areas of application include guest corridors, fitness facilities, restaurants and buffets, as well as high-risk areas such as medical centers and cabins used for quarantine or crew accommodation. The UVD Robot is already deployed at numerous airports, making seaports an obvious extension.

UV-C is an environmentally friendly alternative to chemicals. UV-C does not leave any unpleasant residue lingering in the air, eliminating potential health issues or discomfort to passengers. Unlike hazardous chemicals, there are no storage requirements of the UVD Robot.

▲ **For decades, UV-C has been effectively utilized as a disinfectant in various industries such as healthcare, life science and water treatment. The UVD Robot is a confirmed COVID-19 countermeasure and was a first responder to the early outbreaks in Wuhan, Spain and Italy. Having proved its microorganism elimination value at hospitals and airports all over the world – the UVD Robot is now ready to head out to 'the Seven Seas.'**

A Mature, Award Winning Solution

The success of UVD Robots is based on six years of intensive research, design, development and testing by an industry leader and award-winning organization, in close cooperation with Odense University Hospital and the Danish Healthcare Sector.

The UVD Robot has received a string of prestigious awards. To mention a few: Recommended Solution from Mobile Robot Buyers Guide 2020; ranked on Robotics Business Review's annual list of the 50 most innovative robots to achieve commercial success in the past year; named "European Champion" in the development and commercialization of service robots for professionals (B2B) by Frost & Sullivan.

Green Instruments is proud to introduce the UVD Robot to the maritime industry with global support ensuring a successful integration. ■

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