UBTECH

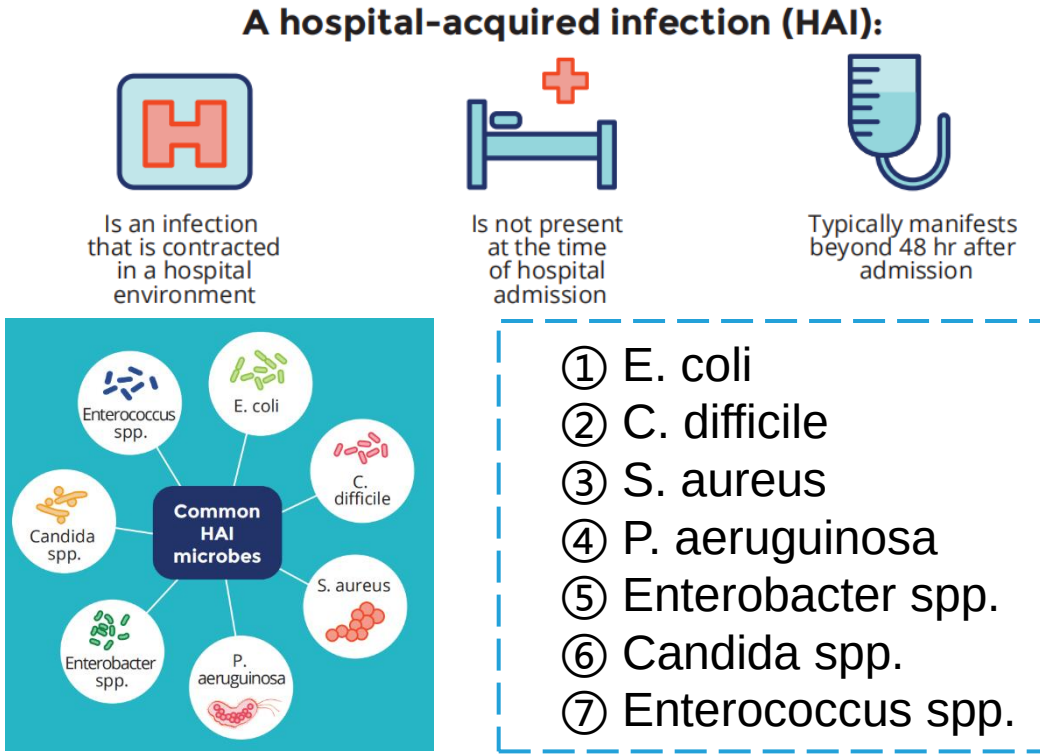
Dream with Robots

ADIBOT

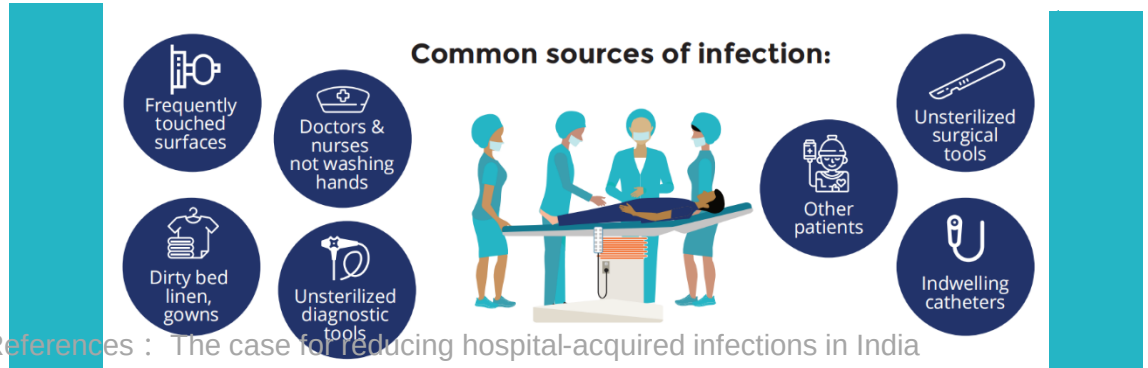
UBTECH UVC Disinfection Robot

Hospital Infection Control Pressure-HAI

Hospital-acquired infection

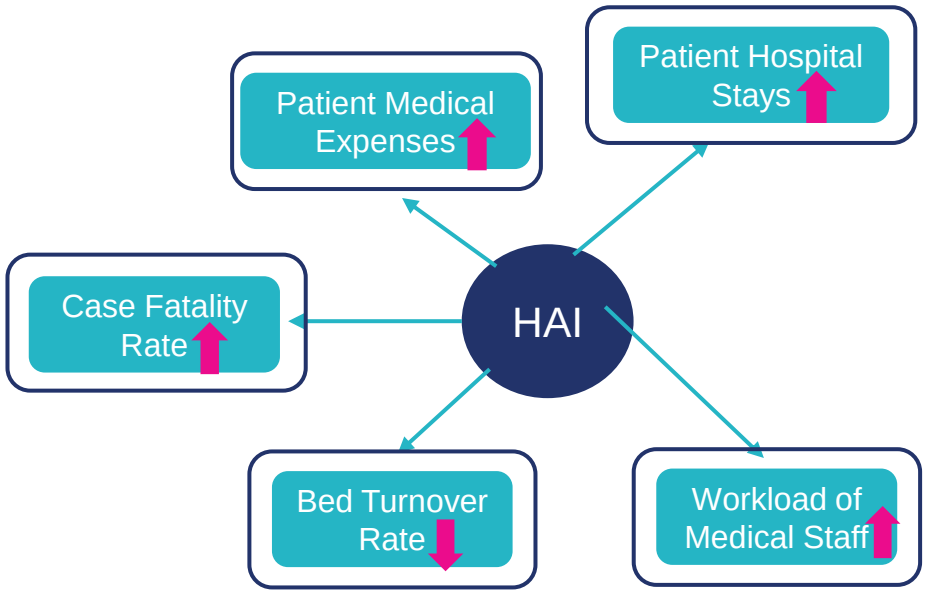


① E. coli
② C. difficile
③ S. aureus
④ P. aeruguinosa
⑤ Enterobacter spp.
⑥ Candida spp.
⑦ Enterococcus spp.



*References： The case for reducing hospital-acquired infections in India

Hospital-acquired infection(HAI) consequences:



European Union → Suffer at least one HAI annually → 4 million patients → Cause death → 110,000 deaths (2.75%)

Hospital-acquired infection(HAI) has caused a huge waste of manpower, material and financial resources. It is a huge public health challenge faced by individuals, hospitals, society, the country, and the world.

*References: “Healthcare-associated infections” in Health at a Glance: Europe 2016: State of Health in the EU Cycle. 2016.

Disinfection Methods Comparison

Methods	UVGI	Aerosolized Hydrogen Peroxide (aHP)	Spray
Mechanism	Damaging DNA or RNA inside the cell, preventing the microorganism from replication.	Denaturing proteins; attack membrane lipids, DNA, and other essential cell components or inhibition of protein synthesis, etc.	Denaturing proteins; attack membrane lipids, DNA, and other essential cell components or inhibition of protein synthesis, etc.
Disinfectant	None	hydrogen peroxide, peroxyacetic acid, chlorine and chlorine compounds, etc.	hydrogen peroxide, peroxyacetic acid, chlorine dioxide, etc.
Reaction type	Physical reaction Produce no disinfection by-products.	Chemical reaction Produce disinfection by-products, even toxic and harmful.	Chemical reaction Produce disinfection by-products, even toxic and harmful.
Scope	Air and surface disinfection	Air and surface disinfection	Surface disinfection
Corrosivity	○○○○○ NO	●●●○○ Yes, especially metal and fabric	●●●●● Yes, especially metal and fabric
Chemical residues	○○○○○ NO. People can enter the room right after the disinfection is done	●●●○○ Yes. Need to be airtight for 4-6h before people can enter	●●●●○ Yes. Ensure environmental ventilation since there're residues on the surface
Safety	Harmful to human eyes and skins. Can only operate when no one is around.	Some disinfectants are skin and mucosa safe at low concentrations, but it is not equivalent to respiratory safe. The hazard can be fatal once inhaled a lot.	Risks of surface chemical residues.
Application scenario	All circumstances of air and surface disinfection as long as no one is around.	Not apply to circumstances of books & files, high precision instruments, metal equipment, fabrics and foods.	Not apply to circumstances of books & files, high precision instruments, metal equipment, fabrics, foods and exits.

Necessity of UVC Disinfection

UBTECH

Broad-spectrum

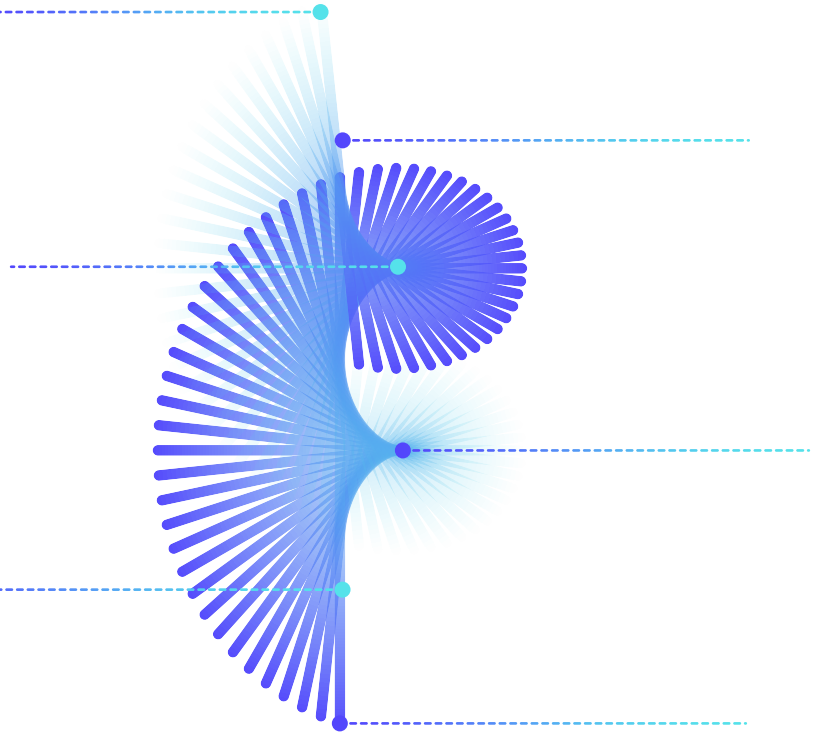
Can inactivate almost all kinds of pathogenic microorganisms.

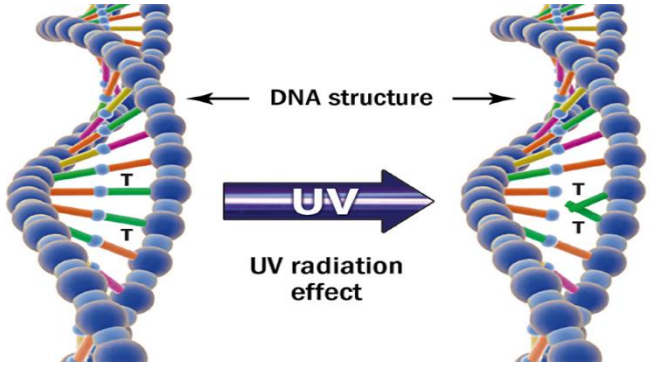
High Efficient

A higher sterilization efficacy with a shorter sterilization time.

Safe & Atoxic

No chemical disinfectants ;
No disinfection by-products.





Non-corrosive

Non-corrosive to surfaces and circumstances.

NO Residual

No chemical residues;
NO secondary pollution.

Widely Applicable

Apply to all surfaces disinfection and indoor air

UVC Is Effective in Killing SARS-CoV-2

irradiation to prevent the spread of measles in rural schools.[64] Currently, UV-C light is commonly used in water disinfection,[65] and its use has been proven to reduce air transmission of tuberculosis[66] and airborne viruses.[62,67,68] Specifically, fluorescence lamps are widely used sources to produce light at a wavelength of 254 nm, which inactivates pathogens through efficient absorption by their DNA or RNA (Figure2g). The inactivation efficiency grows exponentially with the dose, which is proportional to both the exposure time and the light intensity.[62] The fraction of inactivated viruses is roughly given by $1–10^{-F/F_0}$, where F is the applied fluence (in units of energy per area), whereas F_0, which stands for the fluence needed to inactivate 90% of viruses, is dependent on the light wavelength and the type of pathogen. In particular, values in the $F_0 = 3–12$ J/m^2 range were found using 254 nm light to inactivate airborne viruses with efficiencies depending on whether they contained RNA or DNA with single or double strands.[69] For H1N1 influenza, a value below $F_0 = 15$ J/m^2 was obtained at a wavelength of 222 nm.[70] In a more relevant study to SARS-CoV-2, Walker and Ko found $F_0 = 6.6$ J/m^2 in murine hepatitis virus (MHV), a coronavirus, using 254 nm light.[71] More recently, a different study reported close to 100% inactivation of MHV-A59 and MERS-CoV coronaviruses after 5–10 min exposure[72] but, unfortunately, without referring details on the fluence used. Importantly for the present survey, the germicide action of UV-C light placed inside AC ducts has already been demonstrated.[73] These results support the use of UV-C disinfection to mitigate the SARS-CoV-2 pandemic,[41] for which the treatise by Kowalski[62] provides an excellent summary of the state-of-the-art in this technology.

A study published on ACS Nano point out that use of UV-C disinfection can mitigate the SARS-CoV-2 pandemic.

CNBC

SIGN IN PRO WATCHLIST MAKE IT SELECT

MARKETS BUSINESS INVESTING TECH POLITICS CNBC TV

USA · INTL

TECH

Lighting firm Signify says UV light breaks down coronavirus particles in seconds

PUBLISHED WED, JUN 17 2020·6:12 AM EDT

Signify and Boston University validate effectiveness of UV-C light sources on inactivating SARS-CoV-2.

medRxiv

THE PREPRINT SERVER FOR HEALTH SCIENCES

CSH Cold Spring Harbor Laboratory BMJ Yale

UV-C irradiation is highly effective in inactivating and inhibiting SARS-CoV-2 replication

Andrea Bianco[1,§], Mara Biasin[2,§], Giovanni Pareschi[1], Adalberto Cavalieri[3], Claudia Cavatorta[3], Claudio Fenizia[2], Paola Galli[1], Luigi Lessio[4], Manuela Lualdi[5], Edoardo Redaelli[1], Irma Saulle[2,6], Daria Trabattoni[2], Alessio Zanutta[1], Mario Clerici[6,7,*]

[1] *Italian National Institute for Astrophysics (INAF) – Brera Astronomical Observatory, Merate, Italy.*
[2] *Department of Biomedical and Clinical Sciences L. Sacco, University of Milano, Milano, Italy.*
[3] *Epidemiology and Prevention Unit, IRCCS Foundation, Istituto Nazionale dei Tumori, Milan, Italy.*
[4] *Italian National Institute for Astrophysics (INAF) – Padova Astronomical Observatory, Padova, Italy.*
[5] *Department of Imaging Diagnostic and Radioterapy, IRCCS Foundation, Istituto Nazionale dei Tumori, Milan, Italy.*
[6] *Department of Pathophysiology and Transplantation, University of Milano, Milano, Italy.*
[7] *Don C. Gnocchi Foundation, IRCCS Foundation, Milano, Italy.*

The potential virucidal effects of UV-C irradiation on SARS-CoV-2 were experimentally evaluated for different illumination doses and virus concentrations (1000, 5, 0.05 MOI). Both virus inactivation and replication inhibition were investigated as a function of these parameters. At a virus density comparable to that observed in SARS-CoV-2 infection, an UV-C dose of just 3.7 mJ/cm^2 was sufficient to achieve a 3-log inactivation, and complete inhibition of all viral concentrations was observed with 16.9 mJ/cm^2. These results could explain the epidemiological trends of COVID-19 and are important for the development of novel sterilizing methods to contain SARS-CoV-2 infection.

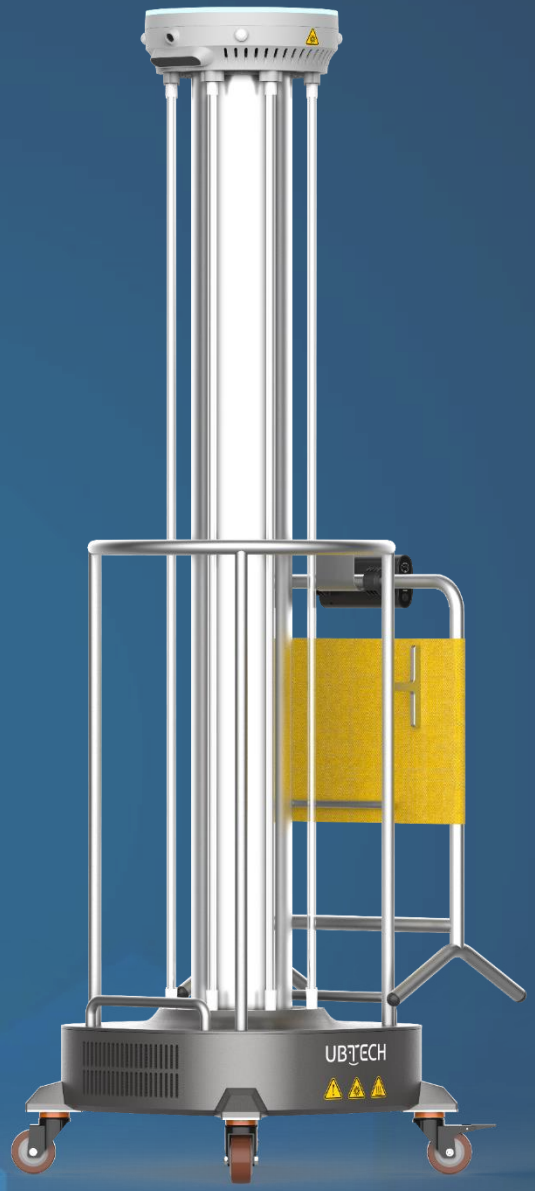
University of Milano, INAF, and IRCCS presented their findings June 23 in medRxiv : **UVC irradiation is highly effective in inactivating and inhabiting SARS-CoV-2 replication.**
At a virus density comparable to that observed in SARS-CoV-2 infection, **an UV-C dose of just 3.7 mJ/cm2 was sufficient to achieve a 3-log inactivation, and complete inhibition of all viral concentrations was observed with 16.9 mJ/cm2.**

Born to Disinfect
Destined to Guard

“A New Type of Technological Force to Fight Against the Spread of SARS-CoV-2”

Focus on Human Health

Improve the Living Environment Sanitation



ADIBOT S

Customer Values

Non-contact Disinfection

Avoid Cross Infection

Avoid contact with pollution sources

No Secondary Pollution

No Disinfection By-products

Do not introduce by-products

Do not generate by-products

Require No environmental ventilation

Ensure Personnel Safety

Eliminate Hazard Exposure

Ensure personnel safety

Release Manpower

One Person to Manage

Multiple Robots

Reduce repetitive labor force

Operating Room Disinfection

School Classroom Disinfection

Metro Carriage Disinfection

Hotel Room Disinfection

Library Disinfection

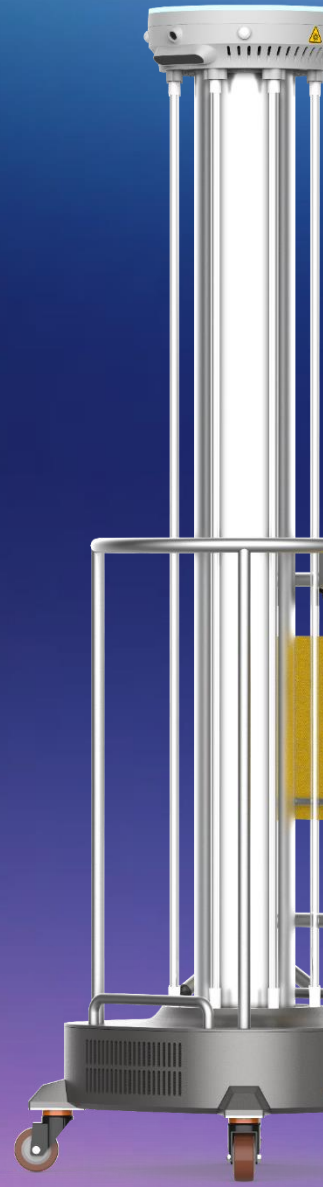
ADIBOT-S Highlights

360° Disinfection

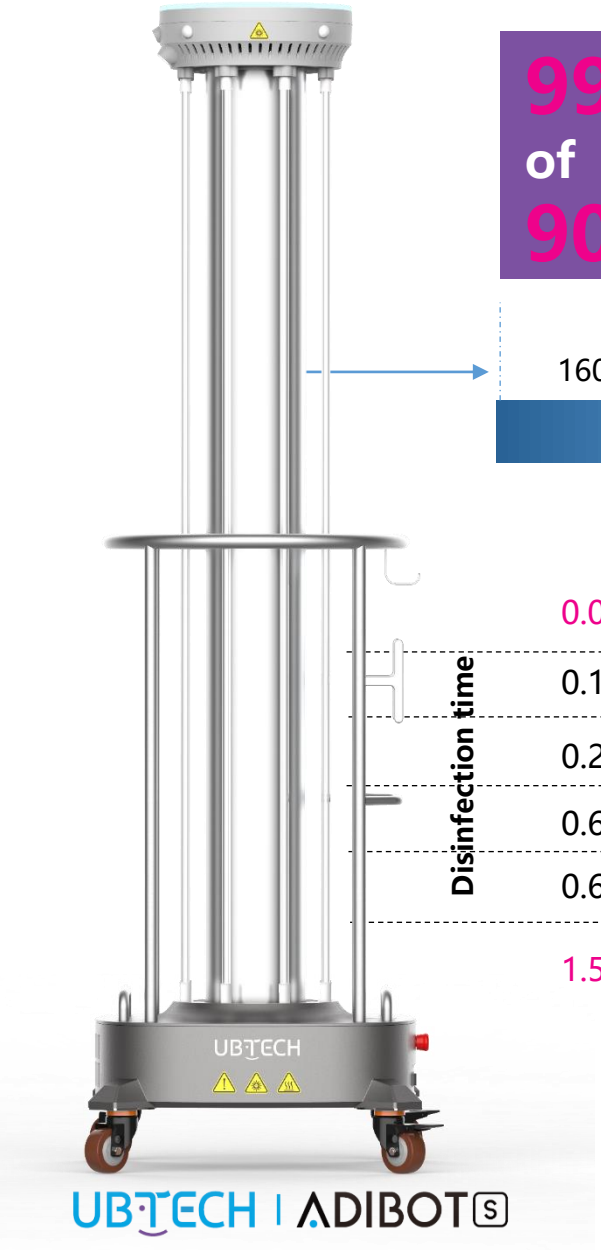
3+4 Safety Protection

Flexible Networking

Practical Detail Design



360° Disinfection



99.99%
of Pathogens Eliminated
90㎡ within 10min

	1600uW/cm2	400uW/cm2	176uW/cm2	99uW/cm2	64uW/cm2			
	Irradiation intensity							
	1m	2m	3m	4m	5m			
	Disinfection distance							
Disinfection time	0.07min	0.28min	0.63min	1.11min	1.72min	**Influenza A & B**	6.6mJ/cm2	99.00%
	0.18min	0.70min	1.60min	2.85min	4.40min	**SARS-CoV-2**	16.9mJ/cm2	99.99%
	0.28min	1.13min	2.56min	4.55min	7.03min	**MERS Coronavirus**	27mJ/cm2	99.99%
	0.66min	2.63min	5.97min	10.61min	16.41min	**Ebola Virus**	63mJ/cm2	99.90%
	0.66min	2.63min	5.97min	10.61min	16.41min	**Foot and Mouth Disease Virus**	63mJ/cm2	99.00%
	1.56min	6.25min	14.20min	25.25min	39.06min	**Norovirus**	150mJ/cm2	99.00%

UBTECH | ADIBOT S

Source:

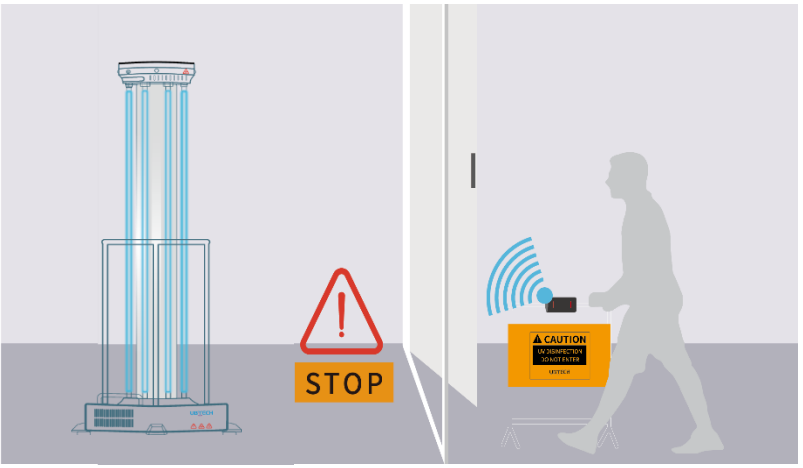
1. *UV-C irradiation is highly effective in inactivating and inhibiting SARS-CoV-2 replication, Andrea Bianco et.al., 2020*
2. *Determination of Ultraviolet Light Doses Needed to Inactivate Bacteria and Viruses on Hard, Sifuentes.*
3. *Fluence (UV Dose) Required to Achieve Incremental Log Inactivation of Bacteria, Protozoa, Viruses and Algae, Adel Haji Malayeri*

.....

3+4 Safety Protection

3 Primary Safety Defence Line

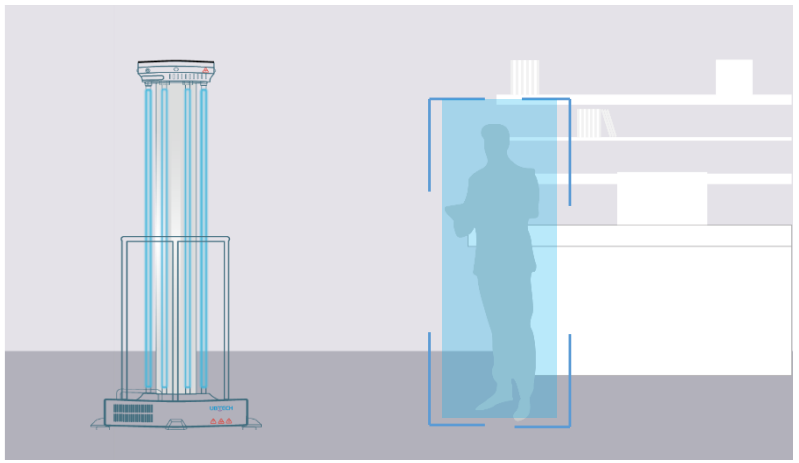
1st Defence Line (20m)



Safety Signage Sensing

- The lamps will be shut down immediately once the robot senses the movement of safety signage.

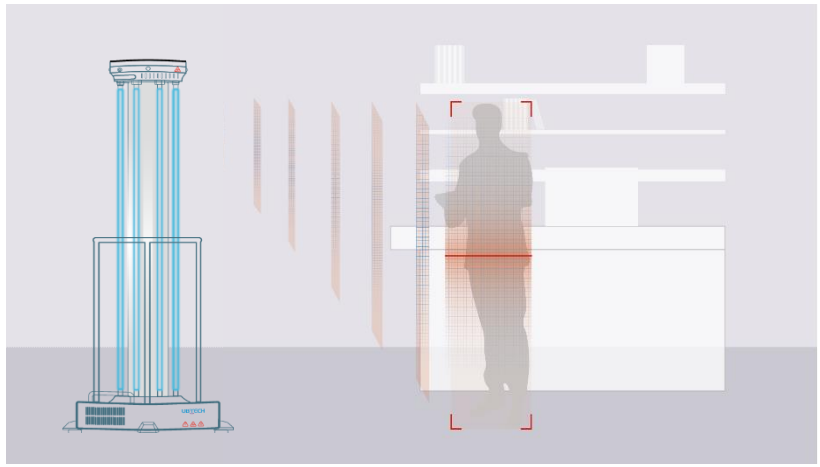
2nd Defence Line (10m)



Human Body Recognition

- The lamps will be shut down immediately once the robot recognizes a human body.

3rd Defence Line (5m)



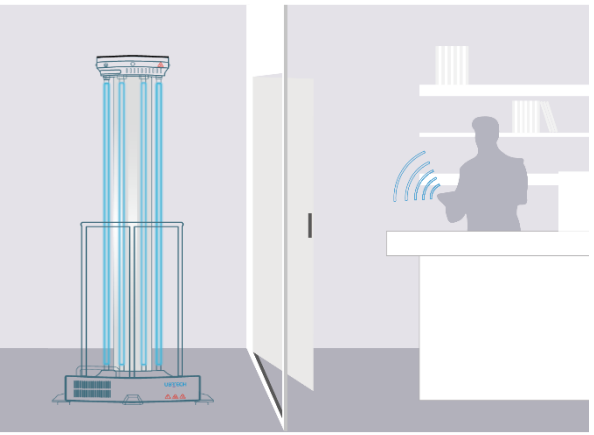
Human Motion Detection

- The lamps will be shut down immediately once the robot detects human motion.

落伤人及液汞泄露污染

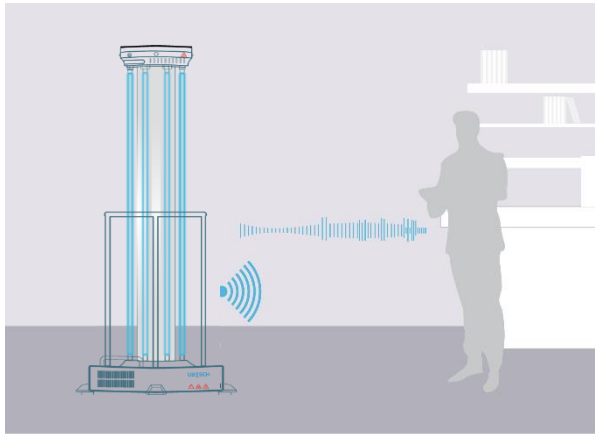
3+4 Safety Protection

4 Complementary Safety



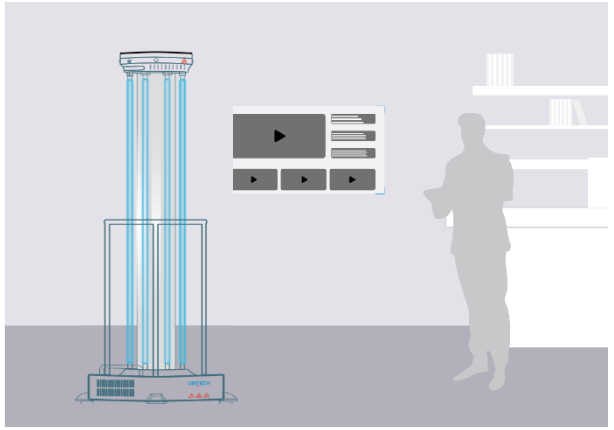
Remote Control

- 4 different ways of remote control to ensure operator safety.



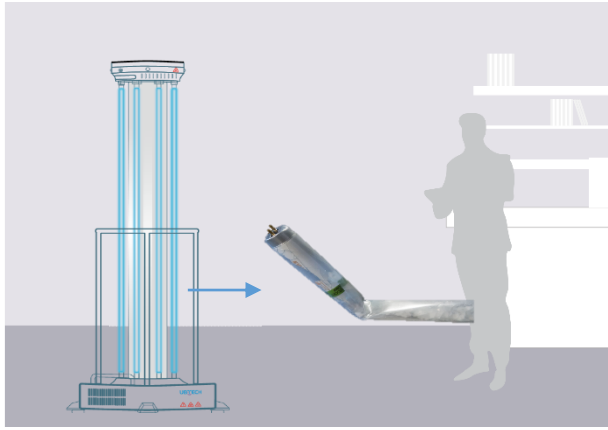
Audio Notification

- A 20-second countdown(configurable) to remind people to evacuate before the lamps are on.



Video Recording

- Traceable disinfection process documented for risk mitigation.

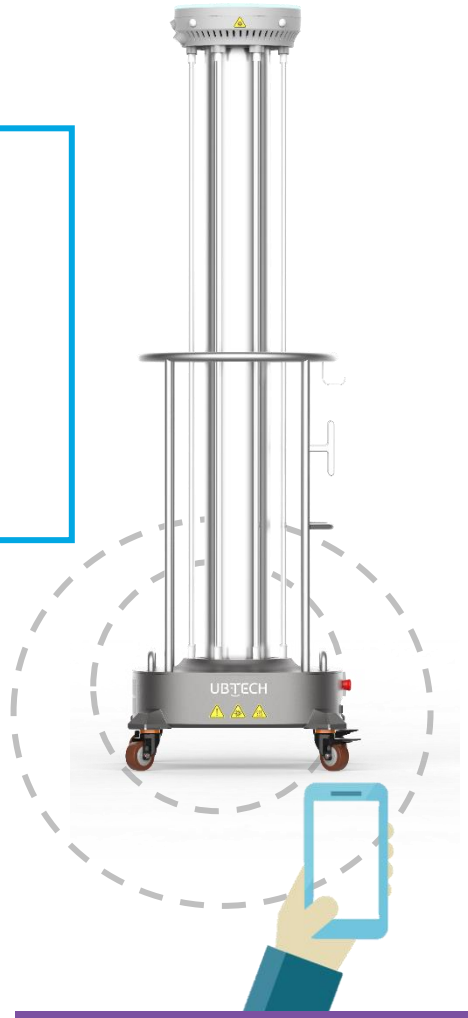


Shatterproof Lamps

- Provided by international renowned manufacturer
- Protects workers, products, and workplace against glass fragments and mercury contamination.

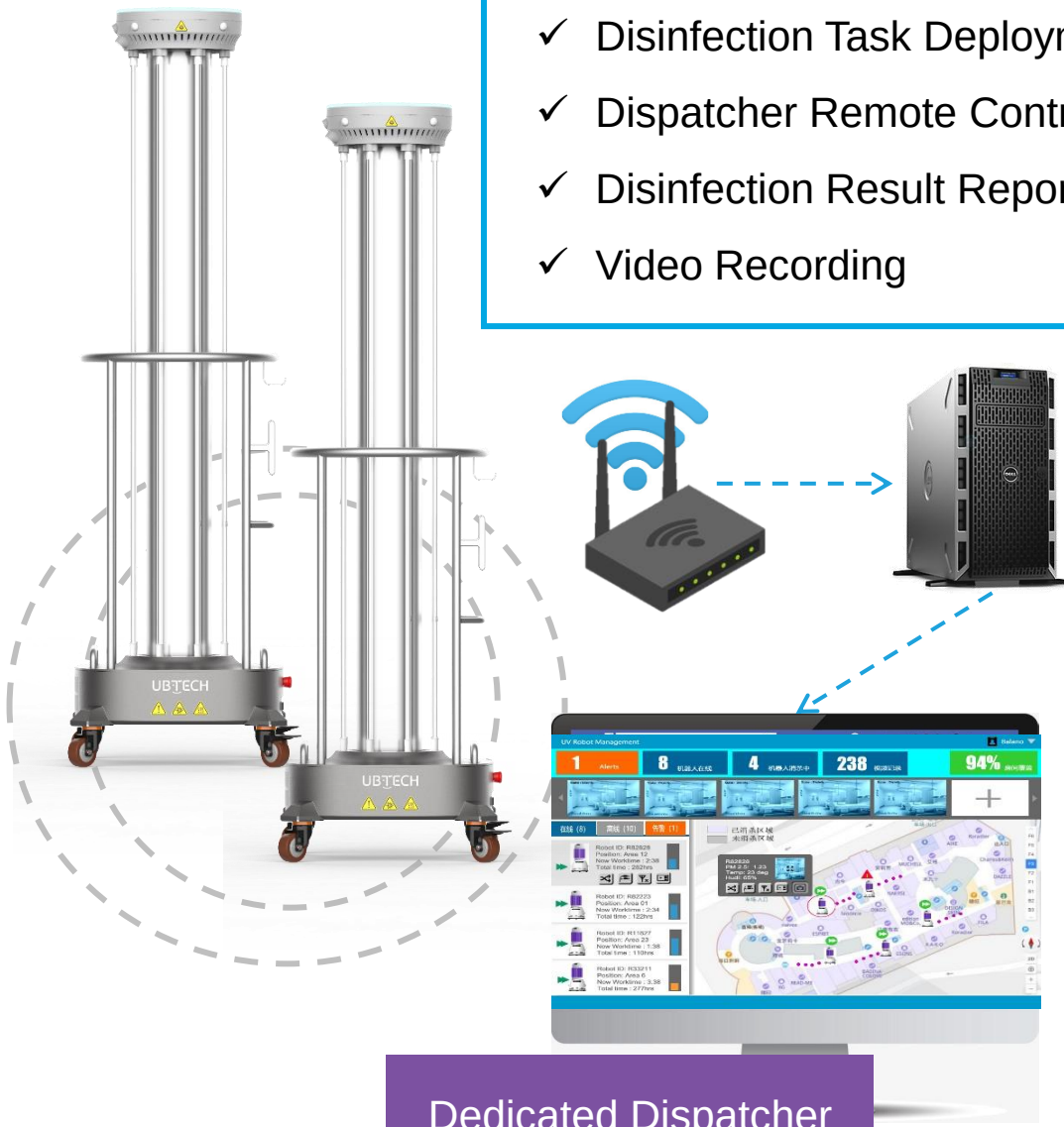
Flexible Networking

- ✓ Remote Controller
- ✓ Mobile Phone
- ✓ Ipad



Standalone

- ✓ Multi-Robot Management
- ✓ Disinfection Task Deployment
- ✓ Dispatcher Remote Control
- ✓ Disinfection Result Report
- ✓ Video Recording



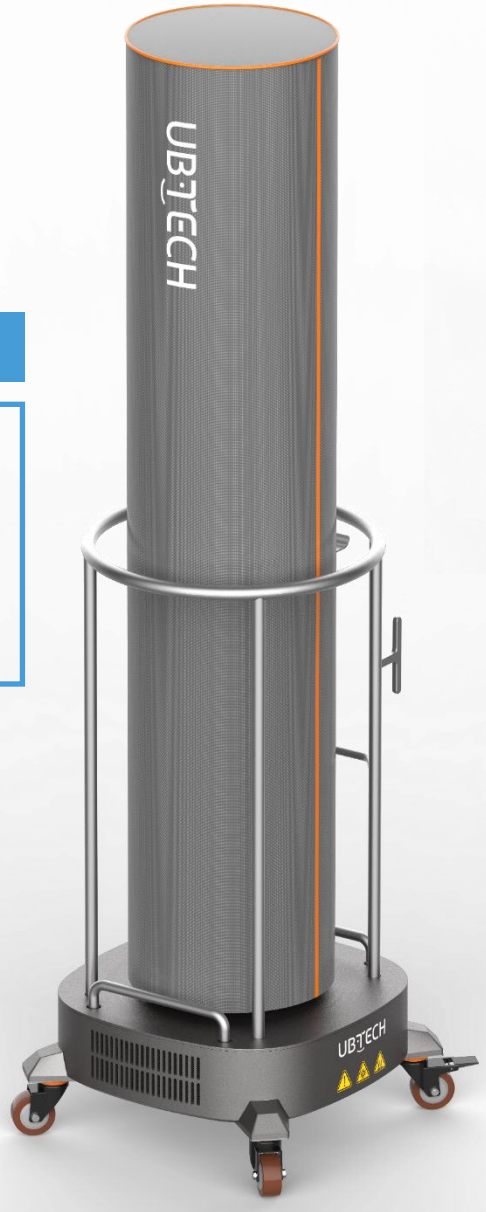
Dedicated Dispatcher

UBTECH | ADIBOTS

Practical Detail Design

Protection Cover

- Lamp Protection
- Waterproof
- Dustproof
- Zip-easy design



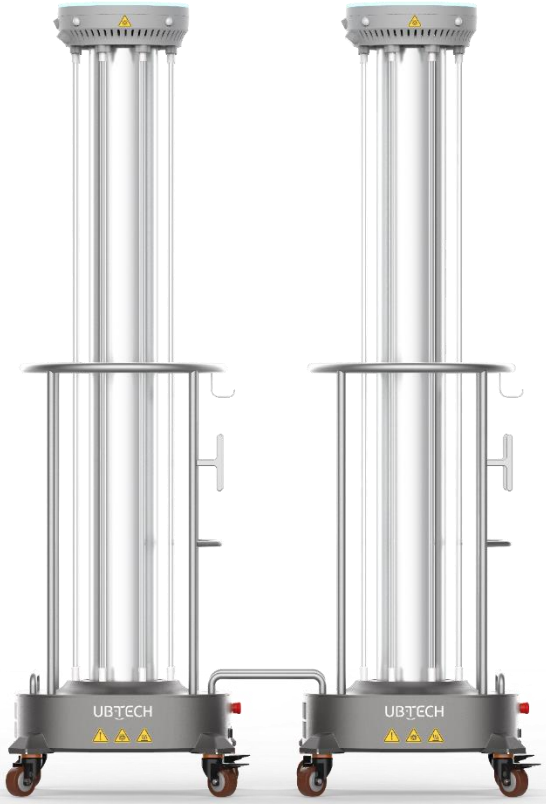
Hook for Cable Winding

- Cable winding and organizing
- Fit for 5-12 meter-long cable

Hook for Warning Signage

- Warning signage of UV-C hazard
- Easy carry

Practical Detail Design



Vents for Cooling

- Both front and back of the robot
- Robotic system cooling

Daisy Chain Hook

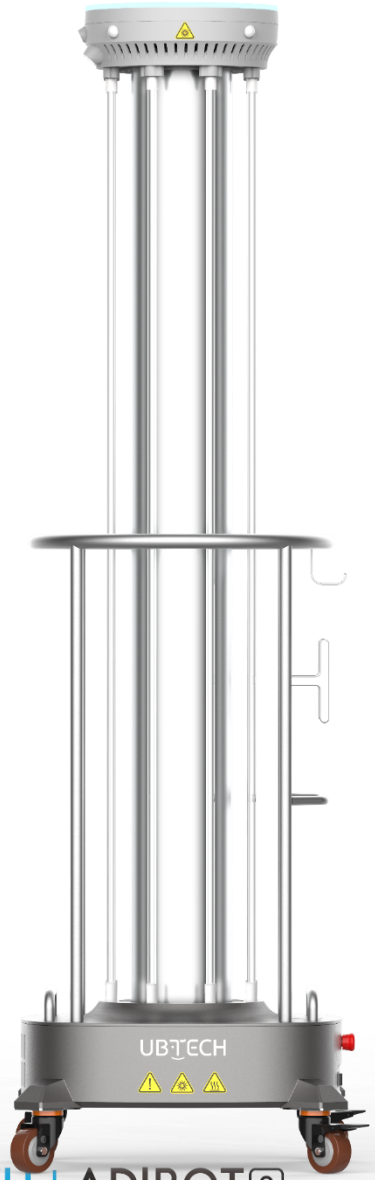
- Square anti-pivoting design
- Firm connecting

Daisy Chain Solution

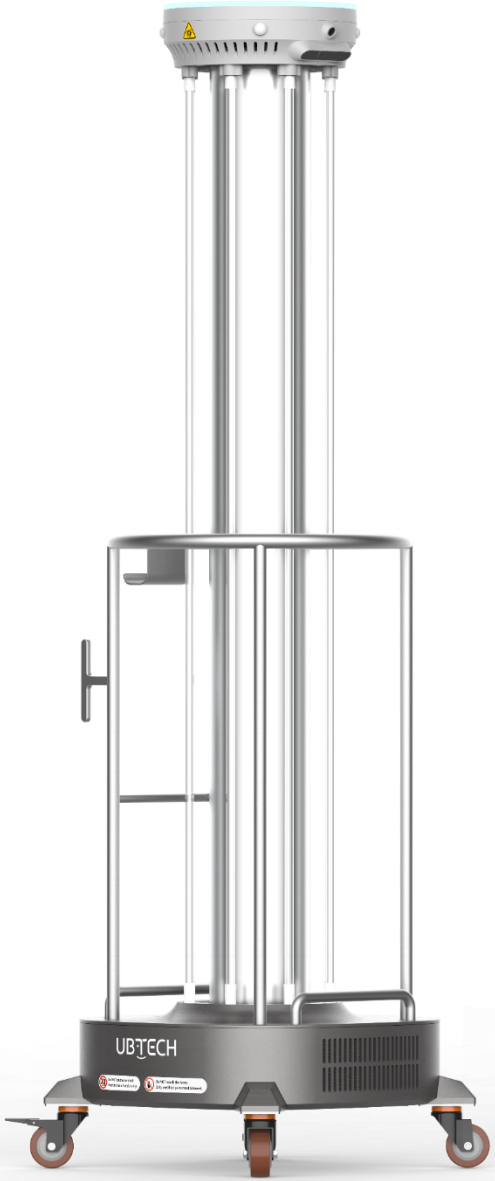
- Increased power and portability
- Omni wheels with locking mechanism

UBTECH | ADIBOTS

ADIBOT-S Dimensions

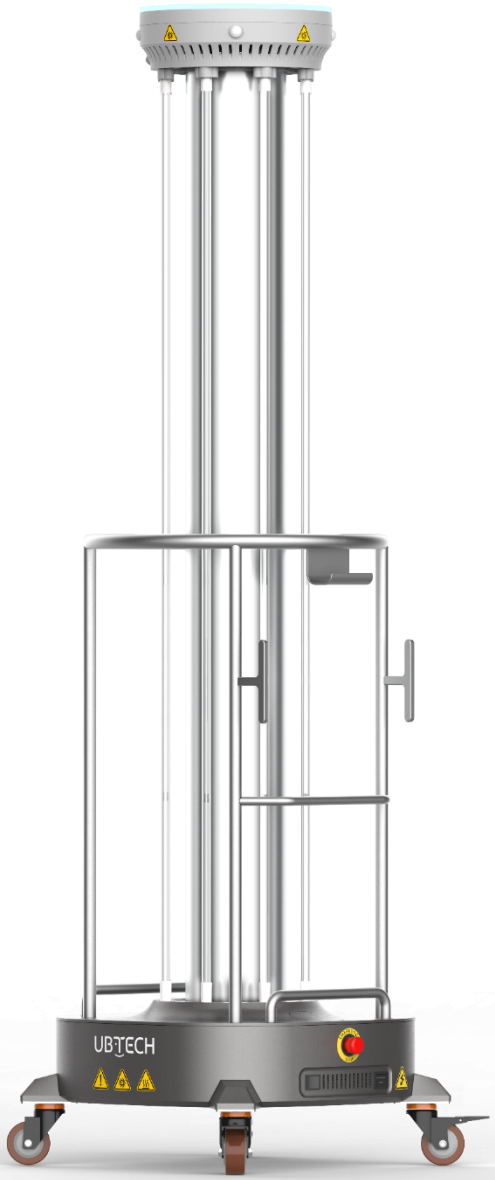


1935 mm



555 mm

1000 mm



UBTECH | ADIBOT S

ADIBOT-S Key Components

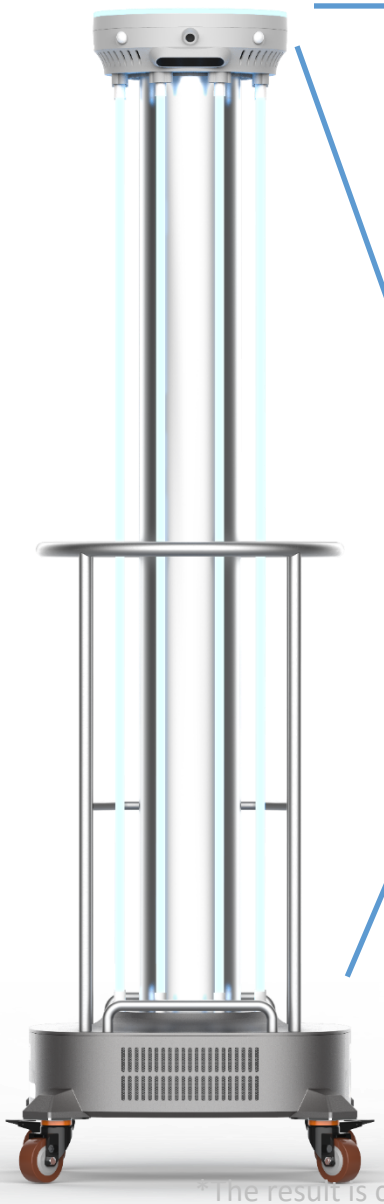
HD Camera

8 UV-C Shatterproof Lamps

Hand Pusher

Charging Port

Omni-wheels W Locking



PIR Sensor

253.7 nm Wavelength

Total UV-C Power 1240W

360 Degree Top to Bottom Coverage

99.99%
of Pathogens Eliminated
90㎡ within 10min

UBTECH | ADIBOT S

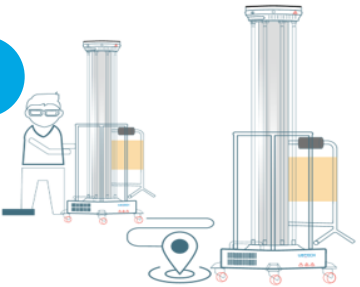
* The result is calculated according to 16.9mJ/cm2, the dose required to inactivate SARS-CoV-2

ADIBOT-S Standard Operation Procedure

1

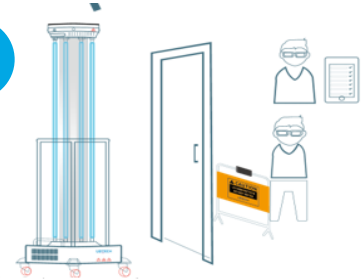
Operator tidies up the room
and conducts security check

2



Operator pushes ADIBOT-S
to the disinfection point

3

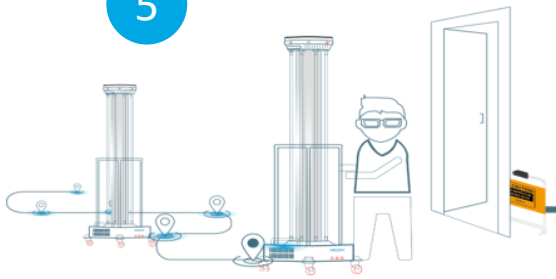


Operator leaves and gives orders remotely

4

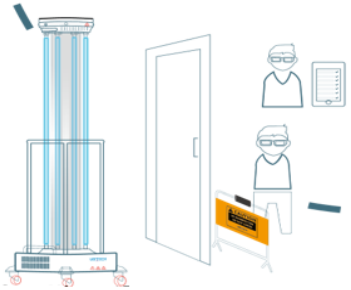
ADIBOT-S notifies once finished

5



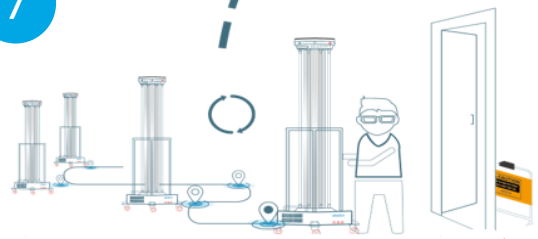
Operator pushes ADIBOT-S
to the next point in the room

6



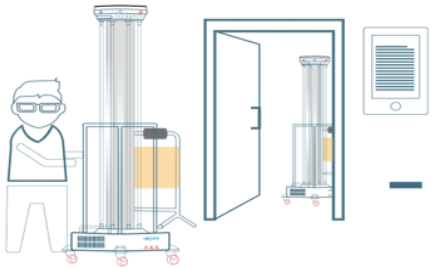
Operator leaves and
gives orders remotely again

7



Repeat until all finished

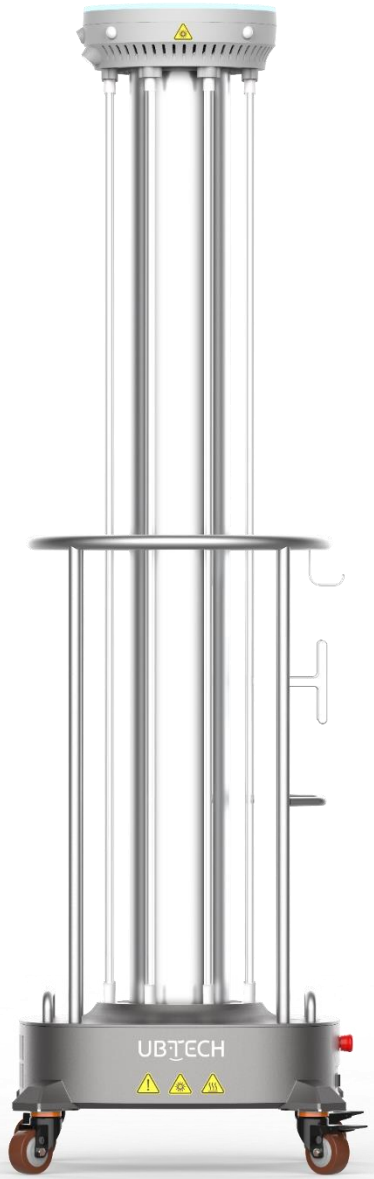
8



ADIBOT-S returns
and sends disinfection report

UBTECH | ADIBOT S

Product Specs



	Items	ADIBOT-S
UV-C	Radiance Angle	360º
	Top UV-C	8
	UV-C Total Power	1240W
Control	WiFi	●
	Remote Controller	●
Safety	Camera Recorder	2MP
	Audio Notification	●
	Emergency Button	●
	PIR Sensor	●
Others	Dimensions	1935(H)*555(W)*555(D)(mm)
	Weight	40kg
	Certification	CE, FCC,ROHS

Product Warranty Policy

Key Parts Lifespan

UV-C Lamps
- 12,000 hours

Warranty

- 1 time on-site/ online training
- 1 year warranty on robotic parts
- Free tech support and after-sales service
- Extendable warranty and service up to 3 years

Thanks !