XDBOT developed at NTU Singapore to disinfect large surfaces

By Eugene Demaitre | April 14, 2020

One of the challenges during the COVID-19 pandemic that robotics developers are trying to solve is the disinfection of large areas. Researchers at Nanyang Technological University in Singapore today announced XDBOT, a semi-autonomous robot that they are readying for public trials.

Global demand for disinfection systems is at an all-time high because of the novel coronavirus. Local news reports said that human cleaners **are working double shifts** because of worker shortages.

The university began developing XDBOT in February, when **COVID-19** cases started to rise worldwide and deep-cleaning efforts intensified **at Changi Airport** and local hotels and hospitals, stated **Chen I-Ming**, a professor at the NTU Robotics Research Center and leader of the project.

"To stop the transmission of a virus means we need a way to quickly disinfect surfaces, which is a labor-intensive and repetitive activity," he explained. "Using our new robot from a distance, a human operator can precisely control the disinfection process, increasing surface area cleaned by up to four times, with zero contact with surfaces."

## XDBOT designed to reach where other robots can't

Most cleaning robots currently on the market are intended to vacuum, sweep, or scrub floors. Relatively few are able to disinfect oddly shaped surfaces or anything above ground level, **NTU Singapore** said.

XDBOT, or "eXtreme Disinfection roBOT," is a wheeled robot with a six-axis arm. That arm enables XDBOT to spray disinfectant where robots are unable to reach, such as under furniture, tabletops, and around doorknobs and

light switches, said the researchers.

Rather than a conventional pressure-spray nozzle, the disinfection robot has an electrostatic-charged nozzle to ensure a wider and farther spread of disinfectant behind and over surfaces. XDBOT's nozzle discharges chemicals with a positive electrical charge. These disinfectants will then be attracted to all negatively-charged surfaces.

Surfaces already covered with the disinfectant will then repel the spray, making this method very efficient, claimed NTU Singapore.
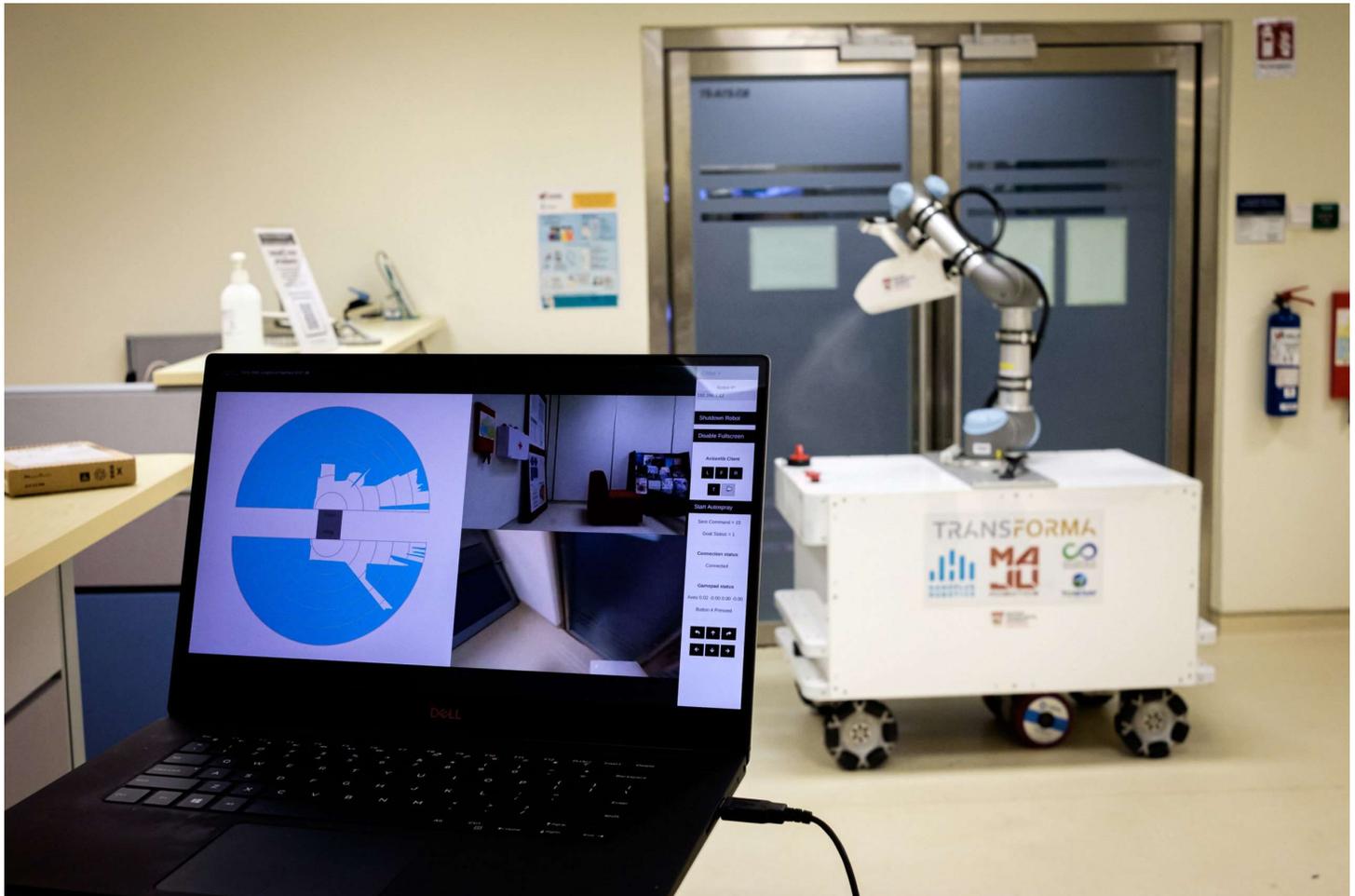

XDBOT is semi-autonomous, removing the need for human cleaners to have contact with contaminated surfaces. Source: NTU Singapore

Semi-autonomous route to disinfection

XDBOT can **navigate** using lidar **sensors** and high-definition cameras, and it can be remotely controlled with a laptop or a tablet. This reduces the need for cleaners to come into contact with potentially contaminated surfaces, said NTU Singapore.

A human operator can control XDBOT's arm like a tank turret from up to 30m (98.4 ft.) away. Mounting antennas on the robot can increase that range to 50m (164 ft.).

XDBOT has an 8.5-liter (2.24 galllon) tank that can hold a variety of disinfectants, depending on the environment. The robot can run for four hours continuously, and its batteries currently take eight hours to recharge. The researchers acknowledged that fast recharging could be helpful.
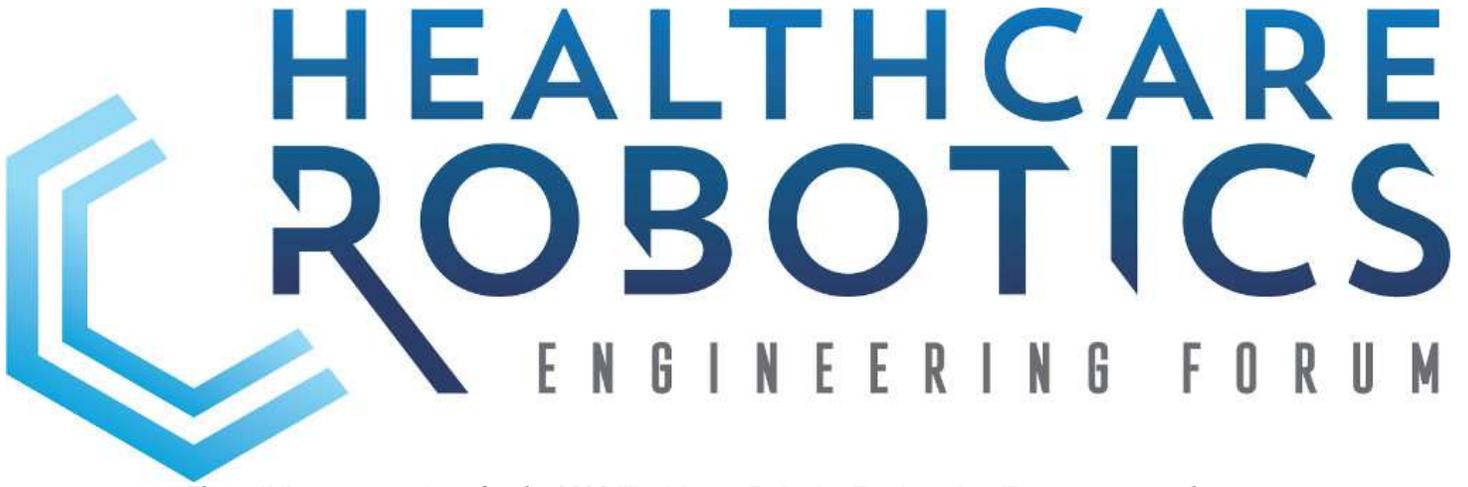
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A collaborative effort

Developed and built on the NTU Smart Campus, the XDBOT went from a theoretical concept to an operational prototype in two months.

Prof. Chen is also the founder and CEO of Transforma Robotics, a spin-off from NTU Singapore. The XDBot was developed by NTU scientists working with Transforma Robotics and two other NTU spin-offs, Hand Plus Robotics and Maju Robotics, along with help from industry partners Asia Centre of Technologies (ACOT) and Tungray Singapore Pte. Ltd. The three spin-offs plan to scale up commercial production of XDBOT once trials are successful.

"During this challenging period, we are proud that our scientists have come together and gone the extra mile to develop a homegrown robotic solution to help address the current manpower crunch in the sanitation industry and to minimize transmission risks associated with COVID-19," said Prof. Lam Khin Yong, senior vice president of research at NTU Singapore.

NTU Singapore also includes the Lee Kong Chian School of Medicine, which was established jointly with Imperial College London. It is checking the temperatures of students and staffers and conducting electronic check-ins. The researchers tested XDBOT in public areas of the NTU campus, and the team said it is in talks with **healthcare** institutions for further testing.

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ABOUT THE AUTHOR

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Eugene Demaitre is senior editor at The Robot Report. Prior to working at WTWH Media, he was an editor at BNA (now part of Bloomberg), Computerworld, TechTarget, and Robotics Business Review. Demaitre has participated in robotics webcasts and conferences worldwide. He has a master's from the George Washington University and lives in the Boston area.