



Robots to the rescue with COVID-19

Robots are often cast in popular science fiction as the villains – soulless automatons that take over the world and enslave mankind. But with the onset of the global coronavirus pandemic, robots are increasingly being employed as helpers, taking on often dull, difficult, and dangerous tasks and thus reducing humans' exposure to COVID-19. *US News & World Report* examines this phenomenon.

Across the world, robotics companies are teaming with health care providers and government officials to develop technological solutions for dealing with the global health crisis. In China, where the coronavirus was first detected, robots with tank-like tread have rolled down streets spraying disinfectant. In at least one hospital in South Korea, robots are being used to check patients' temperatures and dispense hand sanitiser. In Tunisia, authorities have deployed robots to ensure people are obeying the lockdown.

In the United States, two of the principal ways in which robotic technology is being used to fight the pandemic are to disinfect hospital rooms and to act as a telemedicine portal, allowing doctors and health care workers to communicate via video conference directly with patients without unnecessarily exposing themselves to the highly contagious virus.

Robotic Germ-Killers

Among the U.S. companies working to meet the COVID-19 challenge is Texas-based robotics company Xenex Disinfection Services, whose robotic units are designed to disinfect hospital emergency rooms and patients' rooms with germ-zapping ultraviolet light.

The company's LightStrike robots disinfect spaces by using a high-energy UV light produced by pulsing xenon gas, a heavy, colourless gas used in specialised electric lamps, according to Mark Stibich, Xenex's co-founder and chief scientific officer. Although other robotics companies have developed units that use UV light as a disinfectant (Pittsburgh International Airport recently partnered with Carnegie Robotics to become the first airport in the US to deploy robots with UV technology to clean floors), the company says testing by the Texas Biomedical Research Institute demonstrated its robots are the first and only to effectively deactivate the COVID-19 virus.

LightStrike's powerful UV light penetrates the cell walls of viruses, bacteria, bacterial spores, and other microbes, damaging or destroying the harmful cells. "We can actually burst the cell wall with light," says Stibich, an infectious disease epidemiologist.

The company, currently based in San Antonio, began operations about 10 years ago in Houston, where it was working with the world-renowned MD Anderson Cancer Center to develop a robot that could reduce the probability that a patient coming into the hospital would pick up an infection from the hospital environment itself.

Robot goes about its duties

In a typical hospital room setting, trained staff members will place the robot in the bathroom, where it disinfects the area while employees tidy up the main room. Then staff will leave the main room to allow the robot to disinfect it, while remaining outside to avoid exposure to the high-intensity UV light, which can cause damage to the eyes.

To date, Xenex robots have been deployed to more than 500 healthcare facilities worldwide. In addition to MD Anderson, the robots can be found in Arizona-based HonorHealth hospitals as well as facilities of the prestigious Mayo Clinic.

With the onset of the coronavirus, Stibich says the company has seen its customer base expand beyond healthcare to the hospitality business and manufacturing industry. One of the first non-healthcare customers was The Westin Houston Medical Center hotel, which purchased two robots to provide disinfection services for the hotel's clientele, largely consisting of patients at the Texas Medical Center and their families.

Virus hot spots

The company currently has about 500 customers worldwide, Stibich says, with the majority in the United States, but also a number located in countries identified as coronavirus hot spots, such as Japan, Italy, and Spain.

Over the past several weeks, Xenex has been working to ramp up its manufacturing capacity in San Antonio to meet the rising demand for its disinfecting robots. The company has been adding staff and recently added a second production line.

"Under normal circumstances from the time we get a purchase order to when we make delivery is a 30-day window," Stibich says. "Of course, hospitals want them tomorrow or even today, so we're trying to scale up to meet the urgency that's present in the health care world right now."

See Spot Help Patients

Halfway across the country, in Boston, doctors, researchers and robotics engineers have teamed up to bring a friendly, dog-like robot named Spot into Brigham and Women's Hospital, allowing doctors to interact with COVID-19 patients via telemedicine.

While other technology companies, such as VGo and InTouch, have built robots with built-in screens that serve as the doctor's stand-in in health care settings, what sets Spot apart is its four-legged design, which allows the robot to move about easily in different settings, such as the triage tent set up outside the hospital.

The dog-like robot named Spot allows doctors to interact with COVID-19 patients via telemedicine at Brigham and Women's Hospital.

Helping Spot interact with patients

In March, at the onset of the pandemic, a coalition from the hospital, the Massachusetts Institute of Technology and Spot's manufacturer, robotics firm Boston Dynamics, began developing and testing the robot's design to enable Spot to interact with patients, thus reducing the exposure of frontline health care workers to the virus. In the place of a head, Spot has an iPad affixed to a stand, allowing doctors to conduct telemedicine sessions with their patients.

"Most people actually really like it," says Dr Peter Chai, an emergency medicine physician and medical toxicologist who serves as the hospital's chief investigator on the robot project. "We are definitely living in different times now. I think the reaction that people might have had to robotics six or some months ago are probably somewhat different now that we're accepting that there's some kind of distancing that needs to happen to prevent transmission."

The study at the hospital is expected to continue for several months, and researchers plan to publish their findings after its completion. Boston Dynamics has promised to share the lessons learned from the development of its first health care-focused robot, sharing all of its data on the program on a free, open-source basis to all, to give other technology companies the tools to develop their own robotic medical helpers.

Robot's diagnostic abilities

Researchers are working to increase the robot's diagnostic abilities, enabling it to gauge the patient's temperature and measure his or her respiratory rate.

"A lot of work has been done using onboard infrared cameras that we've put on Spot so we can look at vital signs," Chai says. "We're hoping that in a few weeks we'll have expanded capabilities and we'll have heart rate, oxygenation and blood pressure."

Chai predicts that hospitals will continue to find ways to use robots even after the coronavirus pandemic subsides, whether it be through delivering supplies to rooms or seeing patients with other contagious diseases.

"I just don't know what that form factor is going to look like in a few months from now," he says.

Photograph: Research Scientist Hen-Wei Huang, left, interacts with Spot the Robot, during a demonstration at Brigham and Women's Hospital in Boston (**CRAIG F. WALKER/THE BOSTON GLOBE/GETTY IMAGES**)