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Robot dog gets new job of scanning worksite structures

After stint in park sending safe-distancing reminders, Spot is now part of trial in Sentosa

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After a stint at a park last year in which it reminded visitors about safe distancing, Spot the robot dog has a new assignment – helping to do laser scans of structures at worksites and sending the results over 5G for checks.

The four-legged Boston Dynamics machine's new line of work is being tested by the Building and Construction Authority (BCA) and construction company Gammon as part of several 5G applications the Government is trialling in Sentosa.

The 5G@Sentosa project was launched by the Government Technology Agency yesterday. The aim is to roll out the successful trials to the mainland in the next five years.

Using 5G, the worksite scans made by the laser scanner Spot is equipped with can be sent almost instantly to building supervisors elsewhere to check if the structures are built according to their designs.

Such remote checking is useful during times such as the Covid-19 pandemic, when there may be restrictions on people moving around worksites.

Previously, scans were done manually, which was resource-intensive and time-consuming. The scan data is also too large to be sent over the air through 4G.

But Spot, which was deployed at the Bishan-Ang Mo Kio Park in a pilot as a safe distancing robot in May last year, can be programmed to tirelessly scan worksites on its own.

The robot dog's work could be extended to track the progress of and do quality control checks on construction projects. An alternative to Spot is a wheeled robot that performs a similar function.

Another project being tested by BCA and Gammon involves guiding worksite staff and helping them to better visualise installation works at a construction site using augmented reality.

This is done by having staff wear headsets with visors and superimposing digital models of structures to be installed over what the staff see at the worksite in person.

The digital overlay allows users to align actual structures at the worksite more accurately during their installation. This operation needs very low latency and high bandwidth to stream the overlays accurately in real time, which 5G can support but 4G cannot.

Using the digital overlay has safety benefits too, as it also allows worksite staff to do a digital rehearsal of an installation before it actually happens, so any issues that surface can be identified early.

The National Environment Agency and Nanyang Technological University (NTU) are also testing the use of 5G to remotely control a driverless road sweeper in Sentosa during an emergency.

Tests have shown that the vehicle can be operated from NTU, which is about 20km from Sentosa.

The tele-operation system that an operator uses to control the road sweeper looks like a driving simulator and creates the illusion that he is sitting in the vehicle in Sentosa, as it receives data such as videos and sounds sent over 5G from the sweeper's sensors.

So when he helps to navigate the vehicle – for instance, when it encounters tricky road or weather conditions – he can react quickly as he can see the area in front of the vehicle, hear sounds near it and even feel it going over road humps.

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Some govt 5G trials in Sentosa

Sending worksite scans

- Spot the robot dog, or its wheeled alternative, is equipped with a 3D laser scanner.
- The robot is deployed to scan a worksite.
- It sends scans of site structures over 5G to building supervisors elsewhere to check that they were built correctly.

Augmented reality in construction

- A worker wears an augmented reality headset with a visor.
- Digital models of structures to be installed are superimposed on what he sees at the worksite in person.
- The digital overlay sent over 5G allows the worker to align the actual structures more accurately when they are being installed.

Remotely controlling vehicles

- An operator uses a tele-operation system to take control of a driverless road-sweeping vehicle during an emergency.
- Video, sound and motion data collected by sensors from the vehicle is sent via 5G to the operator.
- The operator can react quickly as he can see and hear the vehicle's surroundings almost instantly.

Sources: BCA, GAMMON, NEA AND NTU ST PHOTOS: MARK CHEONG STRAITS TIMES GRAPHICS