As I move, it moves: Toyota's humanoid robot will rock in action mode

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Credit: Toyota

Good things happen when Toyota cozies up to the next generation 5G technology. The news is not about self-driving cars but rather another "tomorrow" topic, in the name of robotics. Toyota has turned to 5G to remotely control a robot and with success.

Toyota Motor worked with NTT Docomo on the event of controlling the Toyota-developed T-HR31 humanoid robot in trials, using 5G mobile communications. They designed an environment with control from a remote location using 5G. Matthew Humphries in *PCMag* wrote on Friday. "Toyota just got its T-HR3 humanoid robot being controlled remotely using a 5G connection." Toyota put its robot effort to the test with NTT Docomo.

The distance achieved is part of the good news. Toyota pulled off the feat of remotely controlling a T-HR3 wirelessly from a distance of 10 kilometers (six miles), which speaks well for what a 5G connection brings to the effort.

(5G stands for fifth-generation cellular wireless. Initial standards for it were set at the end of 2017.)

The word "avatar" got a liberal dose of mentions from news site to site—that is because we're looking at a case where "man and robot merge Avatar style" in the words of *Fast Company*. How the feedback works: "A head-mounted display relays what the bot is seeing and force feedback lets the operator gain a sense of the environment around the bot," said *V3*. *Fast Company* said a human host is strapped into a control harness with hand, arm and foot controls. As the human controller moves, the T-HR31 humanoid robot moves.

A human experiencing feedback controls the robot's body. Humphries said its reason for being was to support human activities in different settings, from healthcare and homes, to environments unsuitable for humans. As for healthcare and home settings, it could be helping people with limited mobility when they want to experience the world outside.

The 5G factor is important because, until now, testing of the third-generation T-HR3 robot had required a wired connection. Humphries said that, with the development of 5G networks, wires are no longer needed.

Having to be wired to the control console severely limited the T-HR3's effective range, said *vr3*.

5G is a big enabler in what Toyota hopes to achieve. Toyota gave credit to low-latency 5G allowing for near-instant feedback—necessary in

settings where robots come to the aid of humans. Humphries said it "paves the way for untethered Avatar-like robots to be deployed in real-world scenarios."

T-HR3 is the company's third generation humanoid robot. *Popular Mechanics* noted flexible joint control and a wide range of motion to the robot's body parts.

It is designed to be a remote control robot; it shows admirable moves in terms of control, balance—think of a ballet dancer skilled in martial arts, and warming up with a set of arm waves, leg extensions, and grasping objects. The robot was designed and developed by Toyota's Partner Robot Division.

The video showing the robot reveals impressive moves—grasping balls, standing on one foot, extending the leg out as in a push and kick move. More specifically, the trials confirmed that the T-HR3 was capable of performing tasks that require force: holding a ball with both hands, grasping blocks and stacking them up into a pile, and shaking hands with a human, "at levels comparable to those of a wired connection."

Toyota Motor Corporation had this to say about T-HR3. "Toyota's latest robotics platform, designed and developed by Toyota's Partner Robot Division, will explore new technologies for safely managing physical interactions between robots and their surroundings, as well as a new remote maneuvering system that mirrors user movements to the robot."

Akifumi Tamaoki, General Manager, Partner Robot Division, talked last year about future developments. "Looking ahead, the core technologies developed for this platform will help inform and advance future development of robots to provide ever-better mobility for all," he said.

More information:

newsroom.toyota.co.jp/en/corporate/25576825.html