Telepresence robots: Always on call

Chris Warner, Executive Editor

Applications processors help bridge the gap between distant doctors and patients

"I've fallen and I can't get up!"

These words from a medical-alert pendant commercial became a humorous catchphrase in pop culture during the 1990s, but Mrs. Fletcher's plea carries a lot of weight to those who are worried about the elderly or others in need of medical care but without a means of communicating to medical professionals or caregivers. Over the years, there have been many ideas intended to close the communications and distance gap between individuals and medical personnel – from medical tags/bracelets to telemedicine and telehealth solutions. Add to the list "telepresence," which further helps close the communications gap between patients and their actual caregivers, using robotics, remote control, and wireless technology.

Telepresence has uses in a variety of environments such as large enterprise and manufacturing facilities, where a robot can help distant engineers and other team members stay connected with their team with live audio and video, eliminating costs and travel time. In office environments, telepresence robots can help managerial workers be in two places at once via instant communications and let them observe their respective teams and processes without physically being there. Telepresence robots are touted as being able to help enhance safety, inspections and security within a workplace.

Healthcare "on the go"
In healthcare, situations in which a long distance between doctor and patient exists or the need to reduce in-person caregiver-patient interactions are particularly suited for telepresence robots. Doctors can perform virtual consultations thanks to real-time audio and video capabilities. Individuals caring for an elderly parent, or social workers looking after an elderly client no longer worry about being present 24/7. Telepresence robots are particularly useful for students unable to attend school to virtually go to class, hear the teacher, ask questions and even have real-time

conversations with their peers – everything a student needs to function; no backpack required.

VGo's telepresence robot can be used in all of these scenarios. The four and ½-foot tall robot weighs in at a mere 17 pounds, has two wheels, (two of which are independently motorized), and can be driven around a facility from remote locations. It connects to the remote driver via either Verizon's 4g LTE or its integrated WiFi (802.11 a/b/g/n). Its "head" includes a six-inch LCD display, professional speakers for clear audio and a remote controllable video camera that can also capture 2 MP still images.

VGo uses a wide range of sensors and actuators for navigation and motors and wheel control, and WiFi and wireless network adapters enable communications. Integrating so many technologies into a telepresence robot presents a host of challenges for the developer, particularly due to the device's size constraints and mobility, requiring design techniques that are quite different than those suited for stationary, "computer-in-a-box" telepresence solutions.

Applications processors help deliver rich features

Designers are always confronted with the need for high functionality, low cost and low power consumption, and that was no exception for the VGo team. According to Ned Semonite, GM and product management expert for VGo Communications, "Robotic telepresence is an extremely complex solution whose elements include audio and video quality, weight, ease of use, network bandwidth and connectivity, reliability and supplemental functionality. Taking one in a positive direction may reduce another."

Applications processors are critical to delivering a rich set of features while keeping power consumption to a minimum. VGo selected Freescale Semiconductor's i.MX27 applications processor, which suits computationally intensive multimedia applications such as video and voice over-IP (V2IP) and smart remote control. The processor's multi-standard video codec provides H.264 video encoding and decoding and supports up to VGA (640 x480 pixels). This processor is the robot's workhorse, supporting the user interface, managing server connections as well as communication with other endpoints such as desktop apps. VGo uses a similar applications processor (i.MX31L) for audio compression and decompression.

Power consumption, of course, involves its own share of tradeoffs, and telepresence robots such as VGo require processors that offer excess power for multitasking. Processors offering power-saving features such as multiple clock and power domains and independent gating are particularly desirable for telepresence robots. Dynamic process and temperature compensation are also important characteristics. VGo's developers further saved power using proprietary software to power off the subsystems and components that are not being used.

Flexibility and scalability enable long life

At $6,000, users can expect long life from their robot. Component flexibility and scalability are important considerations. Applications processors that allow for core and pin compatibility with newer, low-cost parts help eliminate board redesign and repetitive system-level testing. Alex Dopplinger, Freescale Semiconductor's industrial business development manager for microcontrollers, notes that "This is especially important for low-volume applications, such as robotics, where development and test cost is typically much higher than the cost of manufacturing."

A scalable, modular design enables long life for the robot and a better user experience. As part of VGo's service agreements, new features as well as protection against hardware issues are automatically provided over time. That helps ensure that patient care is delivered for many years, and the patient's quality of life with the robot continually improves.

Rolling to the future

As more companies enter the telepresence robot market and hospitals evaluate the devices, more progress is necessary for the industry to reach the "critical mass" of widespread adoption. For instance, Freescale's Dopplinger would like to see the mobile service providers provide more affordable packages to support widespread use of telepresence robots that stream voice and video in real time.

Hospitals, which have more purchasing power than individual consumers, may look to telepresence robotics to enhance efficiencies. Dopplinger estimates that the price of a VGo is less than the cost of a two-day hospital stay; so if patients are discharged earlier with the help of a VGo, the machine helps pay for itself. Perhaps the breakthrough app will come from robots that perform routine tasks while

minimizing staff requirements.

For consumers, the up-front price point of owning a robot will likely need to come down more substantially. Until then, individuals will have to recognize the other real possibilities like the increased amount of face time patients can have with their loved ones and the savings that can come from a reduction in long-distance travel expenses. Still, it’s hard to put a price tag on the additional contact between patients and their caregivers and families plus the freedom these machines offer to everyone.

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