

Soon, That Nearby Worker Might Be a Robot

Safety advances and a keener sense of their surroundings are putting robots to work in such new settings as hospitals, warehouses, and offices

By Rachael King

One of Linda Muniz's newest colleagues is a robot that makes deliveries. On a recent morning, Muniz greeted the robot as it rolled up to the nursing station at El Camino Hospital in the Silicon Valley community of Mountain View, Calif., and announced its presence in a polite female voice.

"I call her 'Tugette,' " says Muniz, who works in hospital admissions. The voice is about the only feminine part of this robot, which was developed by Aethon as part of a product line called Tug, which automatically transports food, medicine, and lab samples around hospitals. The robot looks like a cabinet attached to a giant vacuum cleaner. Muniz can unload Tugette's cabinet, press a green button, and send the machine rolling to its next delivery.

While robots have been around for decades, they've mostly been used in manufacturing jobs considered too dangerous for humans. "Big robots were often behind fences, " says Jeff Burnstein, president of the Robotic Industries Assn., a trade group in Ann Arbor, Mich., that promotes wider use of robots in industry. "Now, we're seeing movement in making robots more intrinsically safe so they can work side-by-side with humans."

Thanks to more advanced sensors and safety technology that can prevent them from injuring people, robots are moving beyond factories and into different types of work. As robots and workers interact more extensively, manufacturers are coping with dramatic expectations from their human counterparts and trying to moderate employees' emotional responses by building a measure of cuteness into the machines. "There's a cultural element that's helped keep robots out of the workplace," says Larry Fisher, research director at market researcher ABI Research. Unlike the Japanese, who are more accepting when robots mix with people, Americans reflect greater conditioning from such movies as *The Terminator* and fear robots. "You're not too anxious to have those come into your office," says Fisher.

Kiva Robots Function Well in Darkness

A further challenge for would-be buyers will be cost. Robots that enable videoconferencing in the office cost thousands of dollars and it remains to be seen if companies can make the business case for buying them.

Many companies are pressing ahead to place robots in unconventional settings. Safety advances make it possible for companies that include Crate & Barrel, Diapers.com, and Gap (GPS) to use robots such as those from Kiva Systems in warehouses to fulfill orders faster. Kiva's robots incorporate industrial shelves on wheels, which a worker can summon to a convenient point in a warehouse. Online retailer Diapers.com employs more than 350 of the robots in three warehouses,

and is adding "hundreds per month," says Executive Vice-President Scott Hilton. Retailer Crate & Barrel has purchased Kiva robots to be installed in its Tracy (Calif.) distribution center in July. One reason Crate & Barrel and Diapers.com decided to use Kiva robots is that the robots can work in the dark, reducing carbon emissions and saving money on air-conditioning and lighting.

General Motors and NASA announced on Apr. 14 that they had jointly developed a humanoid named Robonaut 2, featuring arms and hands that can use human tools. Later this year, R2 will travel to the International Space Station. NASA says the prototype might evolve to one day stand in for humans on spacewalks or perform tasks deemed too difficult or dangerous. GM is now looking to develop further uses for the vision, motion, and sensor technologies built into R2, perhaps to enable cars to reverse with greater security or to make robots more capable of working safely alongside humans in plants. Marty Linn, a principal robotics engineer at GM, says Robonaut's capabilities could be adapted for electric vehicles, which feature similar types of electronic controls.

The robotics market has historically been divided into industrial-use robots, which sold for tens or hundreds of thousands of dollars, and consumer-oriented robots such as iRobot's (IRBT) Roomba vacuum cleaner, which starts at \$160. The fields are converging, with advances in commercial and military robotics trickling down to the consumer market as component prices fall. The worldwide market for personal robots—defined as consumer robots that have some intelligence, use sensors to interact with their environment, and perform a desired function—is expected to reach \$5.26 billion by 2015, up from \$1.16 billion in 2009, according to ABI Research.

Lease Robots Instead of Hiring Humans

Robot makers are seeking new markets. A slew of videoconferencing robots are coming onto the market from makers such as Anybots, Willow Garage, and Vgo Communications, formerly known as North End Technologies. The logic is that workers in another location can use the Internet to control the robots and dispatch them around a workplace to find and speak to colleagues. Using the Anybots device known as QB, for example, it's possible for a remote operator to roll up to a colleague and ask an impromptu question, replicating in some measure the unplanned conversations that occur in offices.

At El Camino Hospital in Silicon Valley, 19 robots fulfill a range of tasks, from delivering medication and food to taking out trash. Hiring as many humans to make deliveries would have cost the hospital more than \$1 million a year, says Ken King, vice-president of facilities and support services. Leasing the robots from Aethon costs \$350,000 a year, which helps the hospital contain costs and offer patients affordable health care, he says.

The Tug robots pull their weight, say hospital officials. Tugette, for example, rolls through El Camino Hospital's corridors making deliveries around the clock, opening doors, summoning elevators, and speaking politely with workers and patients.

Aethon Chief Executive Officer Aldo Zini says his company's robots are used in jobs that people find distasteful or hazardous, such as picking up infectious waste. There's another benefit, he adds: "They don't take breaks and vacation and you don't have to pay them benefits."

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