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The Robot Will See You Now

Surface Attention

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The Robot Will Se

That's not a doctor making the rounds, but it's close. It's a robot called RP-7, produced by a Goleta-based company with roots in UC Santa Barbara engineering and the sciences.

If InTouch Health has its way, patients are likely to see a lot more of these virtual docs in coming years. InTouch, led by a team of UCSB engineering and science graduates, is in the vanguard of a technology that might be called robotics with a human face. Nearly 60 of the company's Remote Presence (RP) robots are now deployed in nearly 30 hospitals, and Yulun Wang, PhD., InTouch's founder and CEO, sees a much larger role ahead for his robots in America's healthcare system.

The reason, he says, is demographics – specifically, the convergence of two long-term trends in the population as a whole and in the healthcare workforce. While an aging America demands more and more medical care, fewer professionals are available to deliver it. "The shortage of physicians and nurses is at an all-time high and getting worse," Wang says, and for him the RP-7 is the logical solution. "What we need is a technology to let this smaller group of people serve this expanding population."

The RP-7 is a robot just over five feet tall, with a video screen for a face and balls for feet. It can't climb stairs or open doors, but it is otherwise highly

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mobile. It hears and sees, with different lenses for different tasks (wide-angle for navigating hallways, close-up for examining patients and reading charts). Its screen displays the face of the physician, life-size and in real time. The doctor can be miles away, but it's almost as if he or she is in the room.

This robo-doc has a lineage going back to the 1980s, when UCSB had the largest robotics research institute west of the Mississippi. Wang was a doctoral student in electrical engineering at the time, and Professor Steven Butner was his thesis advisor. Two other engineers now in key positions at InTouch Health, Bill Stout and Steve Jordan, were also involved with the center – Stout as a staff engineer, Jordan an engineering undergraduate. In those days, the focus of robotics research was on manufacturing micro-electronics, not delivering health care, but Wang and the others were learning a technology that turned out to have a wide range of possible uses.

One of these was surgery. By the early 90s, the traditional robotics venues in manufacturing and defense were in recession. But Wang saw opportunity in the increasingly cost-conscious healthcare sector. He started a company, Computer Motion, that made arm-sized robots used in surgeries. Wang says Computer Motion reached about $25 million in annual sales before it was hit with "heavy-duty patent litigation" and finally merged with the robotics maker Intuitive Surgical Inc. in 2003. By then, Wang had already moved on. The year before he had started up InTouch Health and was assembling the same team – Stout and Jordan – that had worked with him at Computer Motion.

This time around, the goal was to get robotics out of the operating room and on the move. Jordan, who leads InTouch Health's R&D as its vice president of engineering, says mobile robotics posed more of a challenge, with "a broader scope of technologies," than the earlier "manipulator robotics" in the surgical arm. On the other hand, the InTouch team could see plenty of uses for a robot not confined to one site. "Fundamentally it's a communication tool," a way of "projecting yourself into a different environment," Jordan says. The hospital environment was one that the InTouch team already knew well from its experience with the earlier company. So that's where the RP-7 has made its debut.

In essence, the robot is a physician's eyes, ears, face and voice. It enables doctors to see, communicate with and monitor the progress of hospitalized patients from as far away as the high-speed Internet will allow. "Physicians using our robot should be able to do exactly what they could do if they were standing there next to the patient," Wang says. The only limitation is that the robot can't reach out and touch the patient – though InTouch is currently testing a digital stethoscope that could be used by a nurse to take readings on the patient and transmit them via the robot to the doctor. The RP-7 software also can be integrated with a hospital's electronic medical records.

The latest version of the RP-7 sells for about $150,000 and typically is leased for about $5,000 a month. Stout, who directs overseas production as InTouch director of operations, says hospitals now using one or more Remote Presence Robots include the UCLA Medical Center's Neurosurgery Intensive Care Unit, Glendale Adventist Medical Center in California, Mission Hospital in Orange County, Calif., California Pacific Medical Center in San Francisco and Johns Hopkins University in Baltimore, as well as hospitals in Kansas, Detroit and London. The company also sells a robot for nursing homes, called the Companion, but its current focus is on marketing the RP-7 to hospitals.

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InTouch, now up to about 45 employees, assembles the robots at its Santa Barbara headquarters from mostly outsourced parts. It is just a few blocks away from UCSB and is close in other ways as well. The top executives are alumni of the university – in addition to Wang with his UCSB PhD, Stout has an MS in physics and Jordan has a BS in electrical engineering. Wang's PhD adviser Butner, a professor of electrical and computer engineering, is closely involved with the company as an unofficial scientific consultant and talent scout. InTouch recently hired two of his students.

Butner's role goes beyond mere advice and into substantial R&D. For instance, he and his students developed the hardware and software for an improved camera control system in the newest generation of InTouch Robots. Butner calls his relationship with Wang "very synergistic," with benefits on both sides. InTouch gets leading-edge technology, while Butner gets the joy of solving real-world problems. "It's very exciting that I can get something out of my lab and show that it has value to industry," he says.

As InTouch's sales volume grows, Wang hopes to see the company turn profitable this year. In the meantime, it has been gaining recognition for its innovative technology. In October 2005, it was honored by Cisco Systems Inc. as a winner in the Operational Excellence category of the Cisco Growing with Technology Awards. InTouch was among a handful of grand prize winners in five categories with more than 600 applicants. Last spring, the American Telemedicine Association named InTouch a winner of its 2004 Innovation Awards for Telemedicine.

InTouch is also venturing outside health care to explore other possible uses. After all, the power to "extend human perception," as Wang puts it, comes in handy in any number of settings. Jordan says robots could be a powerful "communication tool" in offshore manufacturing, putting the customer virtually on the factory floor to watch the production process and talk with onsite supervisors – all from thousands of miles away. He points to a potentially vast market among the children of aging parents: "My parents live on the East Coast. They're getting older. It would be good to check up on them." A robot, Jordan says, "can see if the stove is off or if they've fallen down."

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Then there is the power of the robot as a presentation tool. Unlike a static projector, a robot can cruise up and down the aisles with its display (and with the right fittings it can project an image as well). Stout says Cisco uses InTouch technology in this way, and InTouch itself uses robotics to keep in touch with its overseas service group. "We talk to them and they talk to us through our robots," he says. "It's amazing how quickly the robot part drops away and you're having a conversation with that person."

So the technophiles and customers are charmed. But what do the patients think? Strange as it may sound, they seem to welcome the robots as a source of human contact. To put it another way, seeing a familiar face on the robot screen is more comforting than facing a stranger in person. Wang says a study of patient satisfaction at Johns Hopkins found that "patients prefer seeing their own physician through the robot than another physician attending in person." Most of the time the robot is accompanied by a nurse, but it doesn't seem to rattle patients when a robot comes into a room alone. "Kids especially like it," says Jordan. Wang argues that, for all its futuristic feel, the RP-7 is an antidote to isolation just as the telephone is.

With so many forces working to make health care more impersonal -- an aging population, a dwindling number of healers and caregivers, and a relentless need to cut costs -- Wang sees his robots coming to the rescue: "I would submit that what we're doing here is trying to re-humanize the system in light of these challenges."