



# A ROBOT IN EVERY HOME

## A DIVERSE ARRAY OF TASK-SPECIFIC DOMESTIC ROBOTS TAKE HOLD

The role of robots in the household has long been an area of fertile speculation. Traditionally, we have envisioned domestic robots as android servants, designed to take over tedious chores and manage our daily lives. In actuality, the robots being brought into the home are more diverse and task-specific than we had initially imagined. Our Roomba is a long way from Rosie, the robot maid of television's Jetson family. Based on market activity to date, future household robots have the potential to fill several niches as systems for entertainment, security, domestic chores, and companionship.

### UNDERSTANDING HUMANS: A Window into Human Needs

What do humans need in order to make home life easier and richer? Often, our guesses for the human applications of a technology are completely upended by the needs that they actually come to fill in people's lives. Market demand is one of the clearest reflections of our desires and aspirations. As robotized systems begin to move into more widespread domestic use, we are already beginning to see their adoption tied to fundamental human interests and idiosyncrasies. It seems that humans want and need robots to do more than just the chores.



Source: <http://www.slashgear.com/roombas-used-to-reenact-pac-man-24104225>

#### DIY Roomba toys

The vacuuming robot called iRobot Roomba, for example, has brought with it a whole subculture of people who name the appliances like pets and even accessorize them. Roombas have been used for a number of purposes other than vacuuming, perhaps indicating that play is as important to humans as work.



#### "Emotional" Robot Pets

Researchers in Taiwan are working on design approach to give home robots the ability to recognize human facial expressions and respond appropriately. It is envisioned that these systems will be able to use this information to mimic real animals and potentially people as well.





## AUGMENTING HUMANS: At Your Service

While only a few domestic service applications of robotics have actually reached the sophistication necessary to fully automate tasks, a number are already in wide use for augmenting human activity. Depending on where the line is drawn, this category could extend all the way to dishwashers with sensors that adjust the intensity of the wash according to the dirtiness of the load.



### Home health assistance

A number of robotic systems have recently been developed for use in the home by people with disabilities.

Source: [http://www.foxnews.com/wires/2006Nov22/0\\_4670\\_RobotsHealthCare,00.html](http://www.foxnews.com/wires/2006Nov22/0_4670_RobotsHealthCare,00.html)



### Automatic ironing

Dressman is an ironing robot that inflates with hot air to dry and press shirts.

Source: [http://www.innovations-report.com/html/reports/process\\_engineering/report-29650.html](http://www.innovations-report.com/html/reports/process_engineering/report-29650.html)

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### AUTOMATING TASKS: True Companions

The modern term “robot” derives from a Czech word for “forced labor,” and the original concept of replacing human toil with automation is coming incrementally closer to reality. However, the supplanting of human labor may not be the most interesting way that automation is beginning to replace humans in a home setting. Robots, it turns out, are already becoming capable of effectively filling the human need for companionship. Expect future systems to explore the degree to which automation can replace elements of human contact in the home.



Source: <http://www.parorobots.com>

#### Robot companionship

The simple Paro robot, designed to look and sound like a baby harp seal, is being used in some nursing homes and living rooms to combat depression among the elderly.



Source: <http://www.wired.com/wired-science/2008/10/toy-robot-inten/>

#### Toys with personality

Zeno is a 17-inch-tall, 6-pound robot boy designed to express a personality and relate emotionally to humans. It can learn and use your name, express emotions, and make eye contact with humans and family pets.

## FORECAST

Home automation will serve as a barometer for the general adoption of robotics by society at large. Many domestic applications will generally be second- and third-generation spin-offs of technologies and approaches originally developed for medical, military, and industrial applications. At the same time, innovative interfaces and software are opening the robotics field to hobbyists in much the same way that early operating systems opened computers to home use. The ranks of these domestically produced robots could ultimately grow to steer the direction of the field.

### (1) Increasing importance of DIY

As with the information revolution, over the next decade large players in the robotics arena will increasingly be disrupted by home do-it-yourselfers and hobbyists. As this ecology becomes richer, expect a few breakout home platforms and applications to enter more mainstream use.

### (2) Emotional automation

One of the more surprising findings of domestic robotics so far is the degree to which emotional attachment can be transferred to robotic systems. While this discovery was accidental in the case of Roomba, expect future commercial products for the home to leverage the opportunity to develop an emotional bond with users.

### (3) Designs for leveling disabilities

Many of the robotic systems set to enter the home in the next decade are designed to help people with disabilities to complete daily tasks. Early prototypes already exist for robotic wheelchairs, assisted eating systems, and robotic health monitors.



While price constraints will likely limit the degree of technical innovation in the domestic sphere, this promises to be a laboratory for recombination and application of robotic capabilities. Domestic robotics will open unique windows into human needs, motivation, and psychology. While industrial automation has unleashed massive new labor power, the integration of robots into everyday domestic life will catalyze new kinds of relationships, both emotional and functional, between people and their artifacts.

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## RESOURCES

- *Love and Sex with Robots: The Evolution of Human-Robot Relationships* by David Levy (Harper Perennial, 2008) tracks how human relationships with our technological creations have changed over the years as real emotional connection has become more possible. <http://www.harpercollins.com/books/Love-Sex-With-Robots-David-Levy/?isbn=9780061562129>
- *Beyond Human: Living with Robots and Cyborgs* by Gregory Benford and Elizabeth Malartre (Macmillan, 2008) looks at the future of robotics and argues that mimicking higher-level behaviors will not be possible, so home robots will remain relatively simple tools. <http://us.macmillan.com/beyondhuman>
- *Citizen Cyborg: Why Democratic Societies Must Respond To The Redesigned Human Of The Future* by James Hughes (Basic, 2004) makes the case that robotic augmentation of humans as a lifestyle will present new social challenges for society. [http://www.amazon.com/Citizen-Cyborg-Democratic-Societies-Redesigned/dp/0813341981/ref=cm\\_lmf\\_tit\\_25\\_russss2](http://www.amazon.com/Citizen-Cyborg-Democratic-Societies-Redesigned/dp/0813341981/ref=cm_lmf_tit_25_russss2)



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