

## The What and When of Service Robotics

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Service robotics is the area of robotics with the strongest predicted growth. According to Future Horizon, service robotics will overtake industrial robotics and gain a dominant share of the estimated \$59 billion robotics market in 2010 (Key Market Drivers Report, 2004). Such predictions are extrapolations of current trends in the area of robot pets, vacuum cleaners, lawn mowers, etc. In addition, it is assumed that 10 million “domestic intelligent service robots” will appear, providing assistance to the elderly. However, the exact function of such robots is still a matter of debate and research.

It is worth noting that \$59 billion is a relatively small market, comparable to today’s annual sales of a computer company such as Dell. The real market explosion is expected for general-purpose domestic robots. Imagine a £5000 robot in every household! The Japanese are firm believers in this market which they think could generate exports similar to the car industry. Honda, Sony and other companies have invested heavily in developing impressive walking and dancing machines. We have been seeing these at exhibitions for several years now. The question is: Why are no domestic robots on sale yet? There must be a few millionaires out there ready to pay the asking price. The answer is that current prototypes of domestic robots are not doing anything useful.

I have asked informally a few women what they expect a domestic robot to do. The answers include: hanging up the washing, cleaning windows, sorting the clothes spread over the floor in children’s rooms, ironing, etc. These are all very difficult tasks for today’s robots. Part of the difficulty is that here one cannot change the problem to suit the technology. Scientists will need to solve problems such as 3-D vision under variable illumination and manipulation of arbitrarily configured pieces of cloth. If the few answers above are representative, such technology will be crucial for the commercial future of service robotics. Surprisingly, a lengthy literature search has not revealed a single research group working on the above problem (of vision and manipulation of cloth). So, when will we see domestic robots in our homes? Given the

current lack of research in at least one key area, the answer sadly must be: not in the near future.

There is a clear relation between the kind of applications proposed for commercial service robots and the research in laboratories worldwide: e.g. cleaning, office delivery, museum tour guides all reflect research in mobile robot navigation. Domestic robotics needs research in several other areas. These can easily be determined by analysing users’ expectations. Surprisingly, there is no publication on that subject either. Reports are full of lists of possible applications, but apparently no one has been asking users what they expect from their robot.

It appears that the development of the service robot market depends on researchers who have little or no objective information on what problems it is important to work on. If they ask me, I would add dusting of books and shelves. Users may be more pragmatic than many scientists like to believe: robots simply are machines expected to do a job efficiently (Aras and Cerqui, 2005). Thus, user-studies are likely to point at some scientific problems that are hard, not very exciting and not very rewarding. Will a paper on the manipulation of wet socks elicit as much peer-esteem as a theory on path planning of non-holonomic systems in  $n$  dimensions? Will it be accepted in a “highly rated” journal? Some value systems may need readjusting.

If service robotics is to happen, we need an honest list of real problems to solve and to start working humbly. Service robotics will arise from service research.

### Acknowledgments:

Thanks to Paul Robinson and Tony Belpaeme for comments on earlier version of this paper.

### References

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Key Market Drivers Report (2004) has been renamed “The Annual Semiconductor Application Markets Report”. Obtainable from: Future Horizon, Blakes Green Cottage, Stone Street, Near Seal, Sevenoaks, Kent TN15 0LQ, UK.  
<http://www.futurehorizons.com/>