Designing Robot Applications for Everyday Environments

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Overview

- Future Everyday Environments
  - Ubiquitous computing
  - Ambient intelligence
  - Robots
- Robot Workshop
  - Motivation, participants
  - Method, Results
- Open questions

Future Everyday Environments

- Ubiquitous computing
  - *The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.*
    (Weiser, 1991)
  - Calm technology (Weiser)
  - Embodied interaction (Dourish)

Future Everyday Environments

- Ambient Intelligence
  - Systems and technologies need to be sensitive, responsive, interconnected, contextualised, transparent and intelligent
    - Seamless communication infrastructure
    - Dynamic and massively distributed device networks
    - Natural feeling human interfaces (<u>intelligent agents, multi-modal interfaces</u>, context awareness etc.)
    - Dependability and security (self-testing and self repairing software, privacy ensuring technology etc)
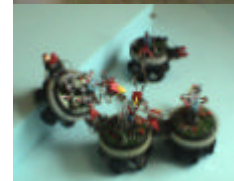
Future Everyday Environments

- Robots
  - Our future assistants at work and at home?
  - Humanoids has been the starting point
    - Robot (Robota - labour) Science fiction
    - Da Vinci's humanoid
    - Still the goal for strong AI!

QuickTime och en
Motion JPEG OpenDML-dekomprimerare
krävs för att kunna se bilden.

Future Everyday Environments

- How can we find alternative views of robots?
  - Robotic products
    - E.g. Furniture robots
      - Robot *pillow* "the Hug" for telecommunication (Carnegie-Mellon)
      - Robotic surfaces "Dynamic terrain"
  - Robots in basic research
    - E.g. Swarming robots

Robot Workshop

- Motivation:
  - *Perhaps our future butlers will not look like humanoids, but rather be like tiny insects that cooperate in large numbers to perform complex tasks?*
  - How can we investigate possible novel robot applications for domestic and other everyday environments?

Participants

- Robot researchers, interaction designers
  - E.g from Napier University, Sony CSL, Carnegie Mellon, ISTC-CNR, University of Siena, Swedish Royal Institute of Technology…
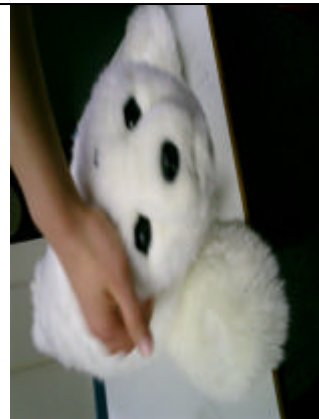- Nationalities: France, Italy, US, Sweden, UK, and Netherlands

Example Views of Robots

- HRI (Human Robot Interaction)
  - The robot as an *relational, evocative* object
  - The robot as assistant
  - How to build robots?
- Basic research robots
- Social perspective of robots

Views of robots

- The robot as an *relational, evocative* object
  - Robot therapy
    - E.g.The Paro Robot for children with autism, elderly at nursing homes etc
  - Robots as pets/toys
    - E.g. Aibo

Views of robots

- The robot as *assistant*
  - For people with impairments
    - E.g. carrying items for people with physical impairments
    - Assisting people with neurogical impairments: can future robots sense and predict epileptic seizures (similar to dogs)?
  - Service robots for chores
    - E.g. Cleaning, guarding

Views of robots

- How to build robots?
  - Toys
    - Simple building kits e.g. Mindstorm etc
    - Hacking more or less expensive toy robots e.g. Robosapien or Aibo
  - Platforms for more advance robots
    - Service robots e.g. People bot, Pioneer DX etc
    - A PC on wheels…

Views of robots

- A social perspective of robots
  - Different environments shape different kinds of social interaction and expectations
    - What *interaction, material, purpose, form* are people already comfortable with in their homes?
  - How can furniture become an embodied agent?

Views of robots

- Basic research robots
  - Swarm-bots
    - Self-organizing and self-assembling artefacts
  - Breed-bot
    - Evolutionary robotics as a possible consumer product?

Workshop Method

- Brainstorming
  - Bootlegging
- Refinement of ideas
  - Fleshing out (discussing pre-defined questions)
  - Thinking hats Edward de Bono
  - Building mock-ups

Boot-legging

- Structured brainstorming technique
  - Suited to multidisciplinary settings
  - Stimulate creativity within target domain

Boot-legging

- Mixing familiar concepts to create juxtapositions that stimulate creativity
  - First generate ideas about
    - Place or situation (e.g. In the kitchen, biking to work etc)
    - User or user group (e.g. Grandmother, secret agent)
    - Type of robot (e.g. Humanoid, wheeled robot)
    - Property of robot (e.g. Automomous behaviour, collaboration with others etc.
  - …then randomly combining them.

Boot-legging

Results

- Application mock-ups and scenarios
  - Robotic travel companion
  - Amusement park guidance
  - Self-organizing robot plants

Results

- Robotic travel companion
  - How could a robot act as a travelling companion for lonely drivers?
    - Providing useful information
    - Entertaining without distracting

Results

- Amusement park guidance
  - Robots that accompany people at amusement parks
  - Enhancing people's thrilling experiences of joy and fear
  - Hovering capabilities?

Results

- Self-organizing robot plants
  - Robots plants on wheels distributing themselves to accomodating crowds of people in public spaces
    - E.g. Guiding crowds to take effective paths
  - Self-coordinating interior objects

Conclusion

- Boot-legging
  - This method created a creative space without having a particular discipline dominating in a multidisciplinary group
  - Many combinations created far-fetched ideas, crossing the border to unrealistic or very futuristic applications.

Future work

- Robots are needed as active components in ambient intelligence
  - We need to explore many varieties of *interaction, material, purpose* and *form* for robots…

Thank you!

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