Thin-bots, Symbots and Stabots -
some random thoughts on robots

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Functionality of a traditional mobile robot

- Traditional mobots need to:
  - sense
  - compute
  - move and act on world
  - (optionally) communicate
- Computation requires tiny expensive computers, which require a lot of power, which require big batteries which require bigger motors to move, which....
- Come to think of it, electrical motors require lots of power. Which requires big heavy batteries, which in turn require bigger and heavier motors to move them, which in turn require...
- What if we replace one or the other of these power-hungry functions with communication?

Thin-bots

- Following network model of thin-client computation, what about thin-client robots?
  - Robot senses and acts, but does no computation of its own.
  - Linked with large stationary power-hungry computer by radio link, and acts as the eyes and hands of that computer.
  - Similar to Eric Paulos' PRoPs, but in this case the robot is providing a telepresence directly for a computer, not a human user.

Thin-bots

- It is not necessary for there to be a one-to-one mapping from computers to robots
  - a single computer might simultaneously control multiple robots (lots of cases where multiple robots provide dramatic increase in exploration abilities)
  - multiple computers might share control of a single robot (negotiating an optimal joint policy).

- Objection - why not just put cameras everywhere? Hmmm, good question.

- Example-in-construction: blimpcam
  - Some possible uses (beyond telepresence):
    - “find Sebastian”
    - “tape me”

Symbots

- Computation is getting smaller, cheaper and less power-hungry all the time, but motors are still clunky
  - Why not get rid of motors and have a robot that is essentially "along for the ride"? Can still act by communicating and asking user or others to take actions on its behalf.
  - Effectively a PalmPilot with sensors, a wireless link, and an agenda of its own.

Symbots

- A few that already exist in some form
  - Museum guide - much like Oliviero Stock's HIPS project
    - `http://marconi.ltt.dii.unisi.it/progetti/HIPS/`
    - a PalmPilot-like device that knows where it is, where it's been, and what feedback you've given it about what it's shown you. Mr. Chips, but without the massive motors, wheels, or navigation problems.
  - Medical Minder
    - already exists in some forms. Have you taken your medication? No, well do it now. By adding sensing and a utility function, could make it much more powerful
      - It's also time to go use the bathroom. It's that room at the end of the hallway.
      - and here, let me take your pulse.
      - Hmmm, I'm not getting any response from you - shall I call for help? Hey Flo, could you come over here (beacon on) and get Dr. Smith on video?

Symbots

- A few that don’t yet exist
  - Road Minder
    - sits on your dashboard and watches the world go by. What's the speed limit here (i.e. - what was the last speed limit sign I've seen?) Was there parking back there? I want the "Fort Pitt exit" - alert me when you see signs about it.
  - Symbio-pup
    - on a dog collar with a GPS, it could direct the dog's movements, deliver packages and messages, etc. Built-in all-terrain vehicle with adaptive obstacle avoidance.
      - “Okay Spot, go left, go left, good. Okay, go right here, and cross the street. Go to the door, Spot. Good. Ring the bell.”
      - "Hello Mr. Jones, Spot is here to pick up the letter - please drop it into the saddlebag he's wearing. Thank you.”
      - “Okay Spot, come on home, across the street...”
    - Downside, of course, is obvious military application: “Okay Spot, now detonate...”

Combining the two?

- Given a wireless Bluetooth-like LAN, a thin-client symbot could just be a small bucket of sensors and communication