

Robotics, ethics and the future

- Robotics – what is it?
- DARPA challenge and STANLEY
- Robot ethics
- Concerns – Bill Joy
- Where is the future heading (incl. BJ again)

Robotics

- Science and technology at the intersection of
AI and engineering
- with the goal of building machines replacing humans
in dangerous and/or repetitive actions

- ASIMO is a humanoid robot created by Honda. Standing at 130 centimeters and weighing 54 kilograms, the robot resembles a small astronaut wearing a backpack and can walk on two feet in a manner resembling human locomotion at up to 6 km/h.



DARPA grand challenge

- Each team given a map with the “road” (geo. coordinates, etc.) 2 hrs before start
- Primarily test of high-speed road finding, obstacle detection and avoidance
- No passing
- Stanley – SU team; a VW Touareg, outfitted with custom interfaces for throttle, brakes, steering and gear shift
- 2004 video
 - <http://video.google.com/videoplay?docid=8594517128412883394>
- 2007 video:
 - http://www.darpa.mil/grandchallenge/video/DARPA_highlight_preview3.wmv

- Sensors for navigation and GPS (to position)
 - Lasers
 - TV camera
 - Radar
- Computers (6 Pentium M), 1G ethernet – all in the trunk
- Designed for driver overtaking control at any time

Software - overview

- All on Linux
- Uses Machine Learning and probabilistic reasoning
- Lasers used for short and medium range obstacle avoidance at 22 m
- Camera input/ vision processing for 70m range (35mph+)
- See robots.stanford.edu/papers/thrun.stanley05.pdf for details

Robotics

- ... all kinds of useful functions:
 - Industrial robots
 - Underwater robots
 - Security applications
 - Medical applications
 - ...
- But what if robots will “have their own mind”?

Robot ethics- Asimov laws

- A robot may not injure a human being or, through inaction, allow a human being to come to harm.
- A robot must obey orders given it by human beings except where such orders would conflict with the First Law.
- A robot must protect its own existence as long as such protection does not conflict with the First or Second Law
- Discussion – variants on the 1st Law

Bill Joy's paper

<http://www.wired.com/wired/archive/8.04/joy.html>

- Motivated by a meeting with Kurzweil and Searle – can robots be conscious? quotes a vision of a robot-driven society (by Kaczynski – the Unabomber!)
- Is disturbed by that vision, and by Moravec's book, seeks opinions
- Concerned by 3 21st century GNR technologies:
 - Genetic engineering
 - Nanotechnology
 - Robotics
- Robots, genetically-engineered organisms, nanobots replicate

- Qualitative changes (technologies able to replace our species) possible due to quantitative progress in the foundations of computers (Moore's law to continue beyond 2010, machine 10^{**6} more powerful than those of today)
- We will "download our consciousness into robotic technology"

Where is Internet going – BJ and others

- See video from Charlie Rose
- <http://www.charlierose.com/shows/2004/11/16/2/a-discussion-about-the-future-of-the-internet>

Where is AI going – see video from Charlie Rose

- Rodney Brooks – subsumption architectures: small, simple robots cooperating
- Future of intelligent machines
- <http://www.charlierose.com/shows/2004/12/21/2/a-panel-discussion-about-artificial-intelligence>