

## AI, Robotics and Moral Machines

(Some slides are from M. Quinn, *Ethics for the Information Age*, Pearson © 2013.)

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## Automation & Robotics

- Automation: Replacement of human muscle
  - Assembly lines
- Robots: Replacement of human decision making in a changing environment
  - Perception integrated with decision-making
  - Drones
- AI Social Robotics: Life-like human robots
  - Emotion, cognition, perception
  - Natural language processing
  - Care-givers

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## Automation and Job Destruction

- Job Destruction
  - Between 1979 and 2008...
    - U.S. population increased 35%
    - Manufacturing employment dropped 31%, from 19.4 million jobs to 13.5 million jobs
  - Lost white-collar jobs as well as blue-collar
- Job Creation
  - Cycle
    - Automation lowers prices
    - That increases demand for product
    - It also increases real incomes
    - Increasing demand for other products
    - Increased demand → more jobs
  - Number of manufacturing jobs worldwide is increasing

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### General Motors Exited Bankruptcy in 2009 with 30% Fewer Employees



Danny Lerman / Corbis

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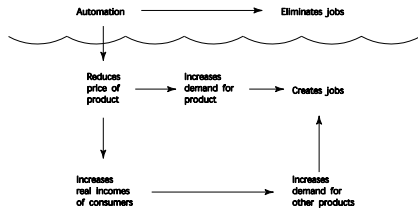
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### Automation Can Create Jobs, Too



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### Effects of Increase in Productivity on Standard of Living & Work Hours

- We have used higher productivity to achieve a higher material standard of living
  - 1990 Americans owned and consumed twice as much as 1948
  - AND.....working hours grew longer
- In medieval or ancient times (before modern capitalism)
  - Low caloric intake meant pace of work was slow
  - Work was seasonal and intermittent
  - Laborers resisted working if they had enough money
  - When wages rose, laborers worked less
  - Medieval England four months of holidays/year, France six months
- 19<sup>th</sup> century industry: Workers literally enslaved
- Workers today work less than workers 100 years ago
- Juliet Schor: Work week got longer between 1979 and 1990
- Today in US: Number of hours worked is significantly higher than France or Germany – highest in first world countries

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### Rise of the Robots?

- Robot: Mechanical or virtual agent; an electro-mechanical machine that is guided by a computer program or electronic circuit.
  - Autonomous
  - Semi-autonomous, "human in the loop"
- Artificial intelligence: Field of computer science focusing on creating intelligent behavior by machines
- Rapid increases in microprocessor speeds have led to various successes in AI
- What will happen as computers continue to increase in speed?
- Some experts suggest most jobs will be taken over by machines

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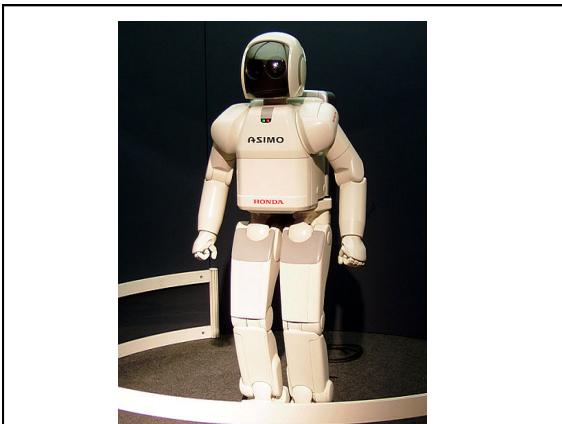
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### Types of Robots

- Robots: Individual Replacement of human decision making in a changing environment
  - Mobility & Perception integrated with simple decision-making
  - Example: Autonomous automobile, drone, robot vacuum cleaner
- Social Robotics: Life-like human robots
  - Emotion, cognition, perception, natural language processing
  - Example: Care-givers
- Robots as Persons: Machine conscious of its own existence

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### Notable Achievements in AI since 1995

- Computer-controlled minivan "drove" on freeways across USA in 1995
- IBM supercomputer Deep Blue defeated chess champion Gary Kasparov in 1997
- Honda's ASIMO android can climb and descend stairs and respond to human gestures and postures
- Electrolux introduced robotic vacuum cleaner in 2001
- Five autonomous vehicles successfully completed 128-mile course in Nevada desert in 2005
- Watson trounced two most successful human *Jeopardy!* champions in 2011

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### Watson Wins *Jeopardy!* Challenge



© AP Photo/Seth Weng

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## Stanley, the Autonomous Vehicle



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## Drones

- Drone is a device that can move without human input
  - Weapon: Can select and fire on people (targets) without human intervention
  - Undertake dangerous tasks: explore radioactive environments
  - Surveillance both good & bad
- Drones vs. Killer Robots
  - Drones have some human oversight

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## Drones

(From [DARPA Strategic Plan \(2009\).pdf](#))



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### Drones within the US

- Police departments
  - Weapons detection
  - Surveillance
    - Warrants?
    - Sound cannons, video camera
  - Example: Rodney Broussart, Lakota North Dakota, arrested for refusing to return 6 of neighbor's cows (2012)
  - Weaponized: Bean-bag gun & Taser
- Home security systems
  - Person can build a drone for \$500
- Homeland Security
  - Border patrol
  - Terrorists within US

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### How many US Drones are there?

- US military has 7,000 aerial drones and 12,000 on the ground (2013)
- Homeland Security has 10 unarmed Predator B drones (2013)
  - Can detect whether person is armed or not
  - Intercept and read cell phone transmissions
- FAA has issued 1,428 permits for domestic drone operators (2007-2013), 10k in 5 years
  - 12 US Police Depts have applied for UAV permits (March 2013)

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### Drones as Weapons and Moral Responsibility

- Utilitarian approach
  - Benefits
    - Reduces the wounding and killing of our soldiers (lower casualty rates)
    - Very effective at killing people who are important and difficult targets
    - Do not act out of revenge, panic, anger, prejudice or fear
    - Do not torture or rape
  - Harms
    - Occasionally kill innocent people
    - Difficult to trace decision-making responsibility
    - Cannot assume decision-making involving compassion, intuition and common sense
  - Overall benefits outweigh the harms

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### Moral Responsibility for Actions

- Who takes the responsibility for unpredictable actions?
  - Policymakers
  - Programmers and Engineers

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### Regulating Killer Robots

- UN Human Rights Commission Report, May 2013
  - Killer Robots that can attack targets without any human input “should not have the power of life and death over human beings”
  - Calls for moratorium on testing, production assembly, transfer, acquisition, deployment and use until can develop rules for use
  - Decisions over life and death in armed conflict often require compassion, intuition and common sense
  - Robots cannot take responsibility for their decisions

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### Examples of Social Robots

- Social Robot talk
- Hanson robot interview
- Kids and bots

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### Ethical Questions Related to Robotics

- Is it wrong to create machines capable of making human labor obsolete?
- Is a drone responsible for its actions?
- Would intelligent robots demoralize humanity?
- Is it wrong to work on an intelligent machine if it can't be guaranteed the machine will be benevolent toward humans?
- What if a malevolent human puts intelligent machines to an evil use?
- How would creative computers change our ideas about intellectual property?

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### The Future?

- Dreyfus suggests that maximally meaningful human experiences require an intuitive shared sense of vulnerability, mood, and emotion that is currently lacking but may be possible with future technological advances that would directly link the bodies or brains of the participants in Second Life with their avatar bodies in the virtual world.
- Are the ethical issues with this?

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### Ethical Questions Related to Robots as Persons

- Machine conscious of own existence
- Is it a person?
  - Analogy with consciousness of animals and perception of pain, e.g. animals as "persons"
  - Would it be covered by the US Constitution as having rights?
  - What if it wanted to reproduce itself?

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### Kantian Analysis

- Creating a robot is like treating another person as a means to an end (scientific experiment)
- Owning a fully conscious robot
  - What if it would be unwilling to accept its status as property (slave)
  - Owning a personal robot would be exploitation
- Therefore wrong to create and own a personal robot

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